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WAR MACHINE

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Development and Production

Desert and Winter Conditions

Long-Range Desert Operations

The Jeep in Action

A fully illustrated guide to Light Vehicles of World War II

WAR MACHINE

Volume 3 **Issue 29**

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Editorial Offices
War Machine
Aerospace Publishing Ltd
10 Barley Mow Passage
London W4 4PH
Managing Editor: Stan Morse

Editorial: Trisha Palmer
Chris Bishop
Chris Chant
Design: Rod Teasdale
Colour Origination: Imago Publishing Ltd, Thame, Oxon
Typesetting: SX Composing Ltd
Film work: Precise Litho Ltd
Artists:
Ray Hutchins
Peter Sarson and Tony Bryant
Industrial Art Studio

Consultant Editor: Major General Sir Jeremy Moore KCB OBE MC, Commander of British Land Forces during the Falklands campaign.

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Orbis House
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WAR MACHINE

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- Modern Cruisers
- Armoured Vehicles of World War I
- Air-to-air Missiles
- Armoured Cars of World War II
- Modern Strike Aircraft

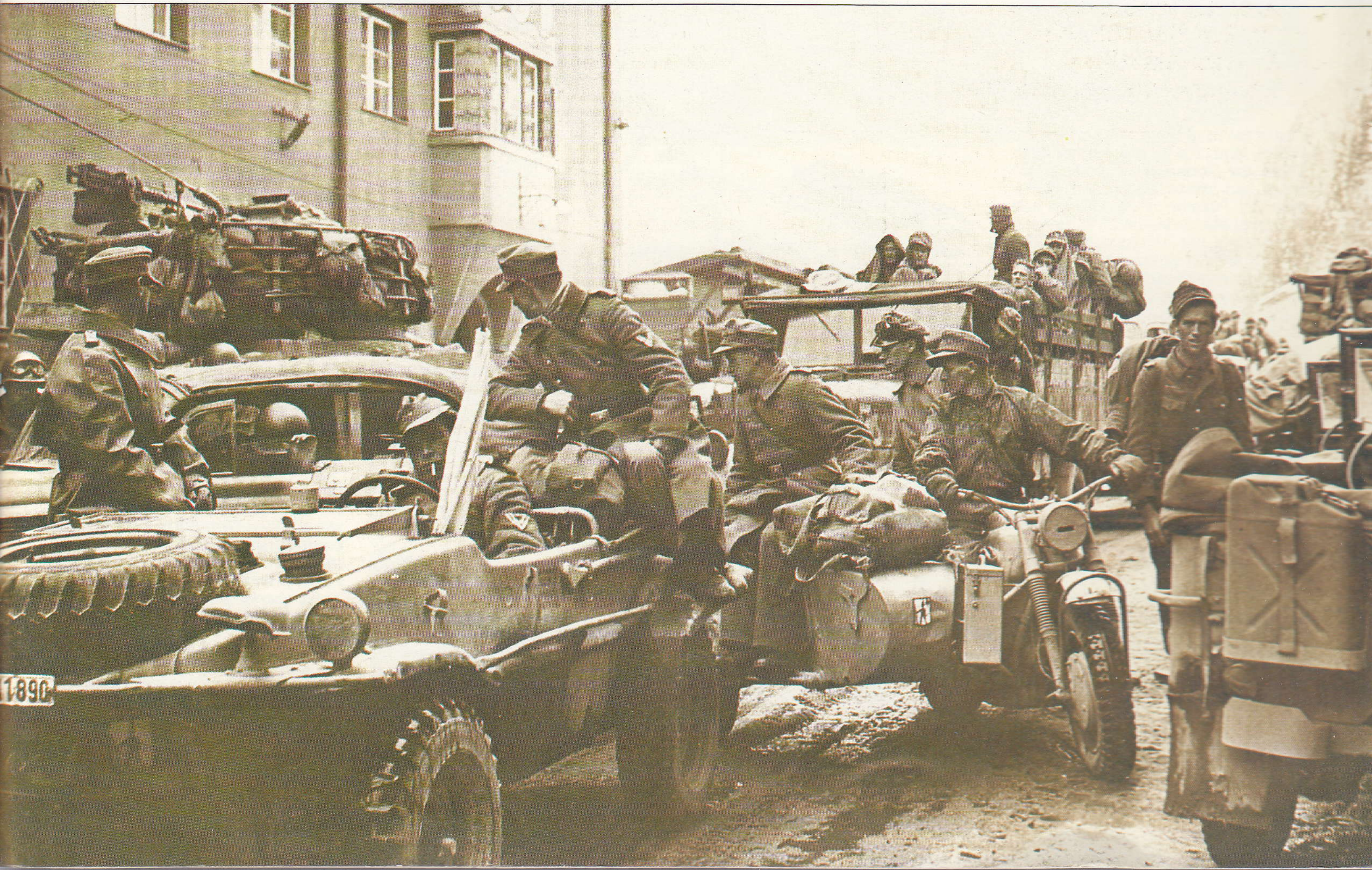
Light Vehicles of World War 11

World War II saw much in the way of innovation, and one of the major changes involved the vastly increased mobility of armies. For the first time, whole formations were motorized, and supporting the fighting troops were a host of vehicles of many types.

The Jeep was found wherever the Allies fought, and no vehicle contributed more to the war effort. From the Pacific jungles to the slopes of erupting Vesuvius, the Jeep gave sterling service.

In recent years a wealth of information has been published about armoured fighting vehicles, but relatively little has appeared on the ubiquitous 'B' vehicle, the unarmoured vehicle designed specifically for military use, without which modern armies would be unable to move. On the Allied side, almost total reliance was upon US production: the UK had lost a major proportion of its 'B' vehicles with the retreat from Dunkirk, and the Soviet Union, evacuating its industry to the east before the rapid German advance, concentrated its industrial might upon AFV production, relying almost entirely upon US Lend-Lease vehicles for logistical and support functions. All nations had made great efforts to achieve standardization and reduce the variety of vehicle types to a minimum. In the Allies' case this was not difficult; the USA managed to restrict its unarmoured vehicle programme to a very limited number of types (six basic classes), and the fact that it was the principal contributor to Allied production facilitated widespread standardization with major advantages in maintenance and resupply. The Germans also had begun the war with a standardization programme, introducing the *Einheit* (standard) or 'E' vehicles, each class of which had several manufacturers producing models that were built to the same specification. Unfortunately for them, these vehicles suffered from severe mechanical reliability problems, were complex to service and maintain, and could not be easily mass-produced in the quantities required; so civilian models had to be adopted. As the Germans occupied country after country, they gathered more and more vehicles, and by the time the Soviet campaign was well under way there were some 1,500 different types of unarmoured vehicle in German service. This made maintenance and resupply a nightmare, and contributed as a significant factor to the eventual German defeat. Towards the end of the war the Germans completed a new standardization programme (the Schell Program) under which the famous Volkswagen Kübel and Opel-Blitz lorry bore most of the brunt of the requirements. By this time, however, it was far too late.

The end of the war, and in northern Italy the victorious 5th US Army meets elements of the German 7th Army. By this time, German transport consisted of whatever vehicles could be obtained.



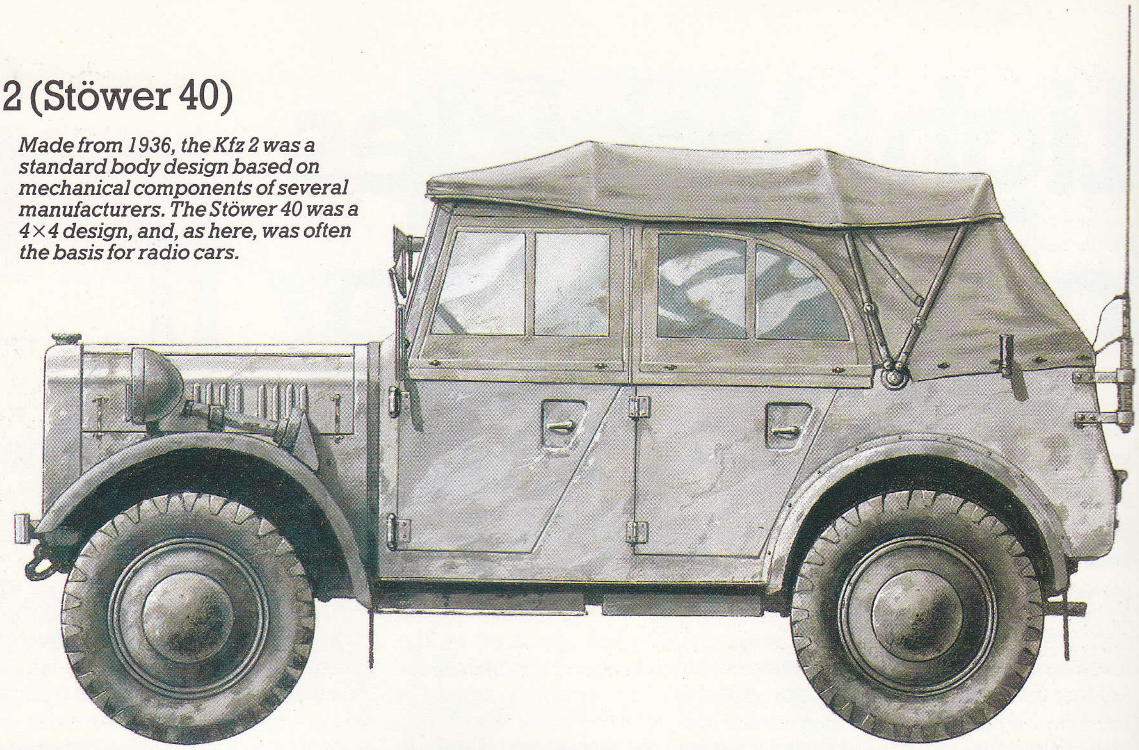
GERMANY

Kraftfahrzeug 2 (Stöwer 40)

During 1934 the Germans made the first attempts to create standardized (*Einheit*) vehicles for the Wehrmacht. Until this time vehicles employed for cross-country work had been based on commercial designs or were conversions of them. The new army motorization programme placed great emphasis upon the design of vehicles from not only technical but also operational considerations. A new system of Kfz (*Kraftfahrzeug*, or motor vehicle) numbers was introduced, whereby numbers were allotted to vehicles (irrespective of make or model) to denote their tactical or military function. With few exceptions, for the vehicles covered here these Kfz numbers were broken down into the following classes: 1 to 10 covered l.Pkw (*leichter Personenkraftwagen*, or light personnel carrier); 11 to 20 covered m.Pkw (*mittlerer Personenkraftwagen*, or medium personnel carrier); and 21 to 30 covered s.Pkw (*schwerer Personenkraftwagen*, or heavy personnel carrier).

The l.Pkw was a standard vehicle irrespective of its models or manufacturers, with the exception of the engine, which was always that of the manufacturer and commercially available. The engine was made by Stöwer, BMW and Hanomag from 1936 onwards. The Stöwer model (**Kraftfahrzeug 2**) used AW2 and R180W water-cooled 4-cylinder OHV petrol engines with dry-sump lubrication. The chassis was of normal type with a frame of rectangular section, side- and cross-members, and bracing to support the engine, transmission and body. The hood was hinged down the centre and fastened on each side by two clips. The chassis was used for the 4-seater light car (**Kfz 1**) and for a variety of other special-purpose vehicles.

Made from 1936, the Kfz 2 was a standard body design based on mechanical components of several manufacturers. The Stöwer 40 was a 4×4 design, and, as here, was often the basis for radio cars.



Specification

Kfz 2 (Stöwer 40)

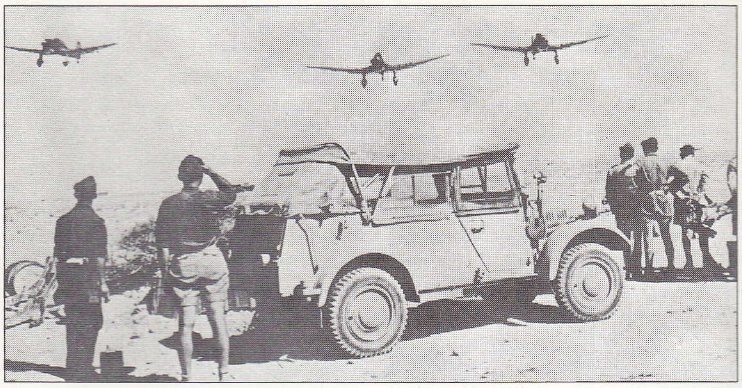
Dimensions: length 3.58 m (11 ft 9 in); width 1.57 m (5 ft 2 in); height 1.78 m (5 ft 10 in); wheelbase 2.24 m (7 ft 4 in)

Weight: net 1815 kg (4,001 lb)

Powerplant: one Stöwer AW2 or R180W 4-cylinder OHV petrol engine developing 50 bhp (37.3 kW)

Transmission: five forward and one reverse gears

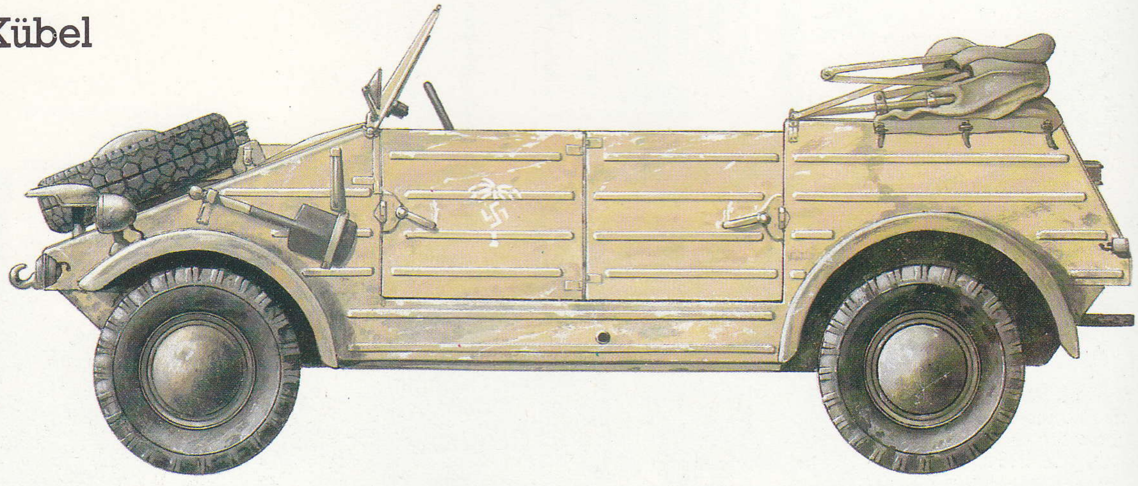
Tyres: 5.50×18 (metric)



A Luftwaffe Kfz 2 in the desert. The Junkers Ju 87 'Stukas' are just returning from a mission, as shown by their bombless condition.

GERMANY

Volkswagen Kübel



The ubiquitous Kübel (bucket) served wherever the German armies were. Allied/German production contrasts are underlined by the fact that only 55,000 of these handy vehicles were produced from 1940, as compared with 600,000-plus Jeeps produced from 1941-5.

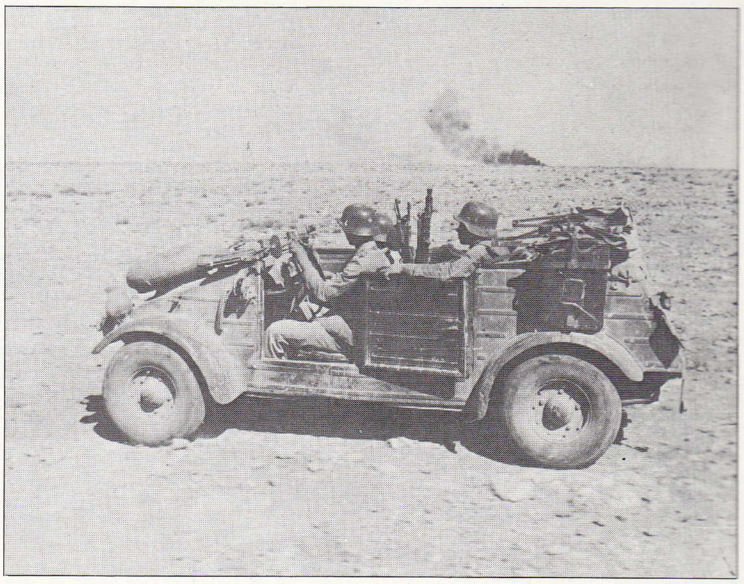
One of the most famous military cars of World War 2 was the **Volkswagen Kübel**, the German Jeep. During 1933 Hitler had instructed two car designers (Dr Porsche of Auto-Union and Werlin of Mercedes-Benz) to develop a 'people's car' (Volkswagen). The basic Volkswagen took shape on Porsche's drawing board as early as 1934. In 1936 the first design for a Volkswagen cross-country appeared, designated **Volkswagen Typ 62**. When the decision was reached that the only new personnel carrier to be employed by the Wehrmacht would be the Volkswagen, serving as the standard light passenger car for all arms, design changes were requested resulting in the **Typ 82**. During 1938 work was undertaken on the Volkswagen plant at Wolfsburg, and production began in March 1940.

The vehicle was designed for lightness and ease of manufacture. Built as cheaply as possible, it comprised components of simple design. Generally, the layout was very similar to that of the Jeep. The method of suspension, together with the use of a self-locking differential, gave it remarkably good cross-country performance. After initial problems, the 998-cc Volkswagen Typ 1 4-cylinder HIAR air-cooled engine soon became one of the most reliable powerplants ever. With its excellent automotive qualities and simple maintenance level, the vehicle fully met the high demands of military use, especially in the desert and USSR. The military version had a touring body of sheet metal with a folding top. Four doors were provided, and weather protection was afforded by a folding canvas hood and side screens. The body panels were mostly of 18-gauge stampings. Tubular struts were used as the basic structural members of the body. The engine cylinders were of 'H' form and laid flat at the bottom of the car. The chassis consisted of a central welded-steel tube bifurcating at the rear to support the engine and transmission, and the steel floor on each side of the central member supported the body. The front axle consisted of steel tube which housed the two torsion bars of the suspension. At each side of the differential were universal joints providing centres about which the two rear driving axles could articulate, and the rear wheels were stabilized laterally from the differential housing. The auxiliary gearboxes in each rear wheel brought the two half-shafts higher and so gave a greater ground clearance. There was independent suspension on all four wheels, and double-action hydraulic shock-absorbers controlled the movement of the rear springing. The steering gear and connectors were of conventional type. The brakes were mechanical, cable-operated, and had double lever action on the brake shoes. Transmission was through a single-plate clutch gearbox. An overdrive was incorporated in fourth gear. The fuel tank was located below the instrument panel, facing the front right-hand seat.

This vehicle was also designed with an enclosed body, designated **Typ 92**. All models built from March 1943 had a larger engine (1131-cc capacity). By the end of the war some 55,000 Typ 82s had been produced (production ceased in mid-1944). To accommodate the various bodies required, an order was issued on 2 August 1940 demanding widening of the chassis by between 6 and 8 cm (2.36 and 3.15 in) in what became the **Typ 86**. The normal Kübelwagen was not very successful in the desert and so the *Tropenfest* (tropical) version was developed with numerous changes including the use of larger sand tyres. Volkswagen Kübels used in Africa were often referred to as *Deutsches Kamel* (German camel). There were numerous special-purpose models of the Volkswagen Kübel, many of them adopted by the Wehrmacht.

Specification

Volkswagen Kübel
Dimensions: length 3.73 m (12 ft 3 in); width 1.60 m (5 ft 3 in); height 1.35 m (4 ft 5 in); wheelbase 2.39 m (7 ft 10 in)
Weight: net 635 kg (1,400 lb)
Powerplant: one Volkswagen Typ 1 4-cylinder HIAR 998-cc petrol engine developing 24 bhp (17.9 kW), or from March 1943 one Volkswagen 4-cylinder 1131-cc petrol engine developing 25 bhp (18.6 kW)
Transmission: limited-slip differential giving four forward and one reverse gears, with overdrive on fourth gear
Tyres: 5.25×16



Kübels were not at first successful in the desert, so a* Tropenfest *(tropical) version was developed. Changes were numerous, including the use of sand tyres, and the altered model came to be known as the 'German camel'.

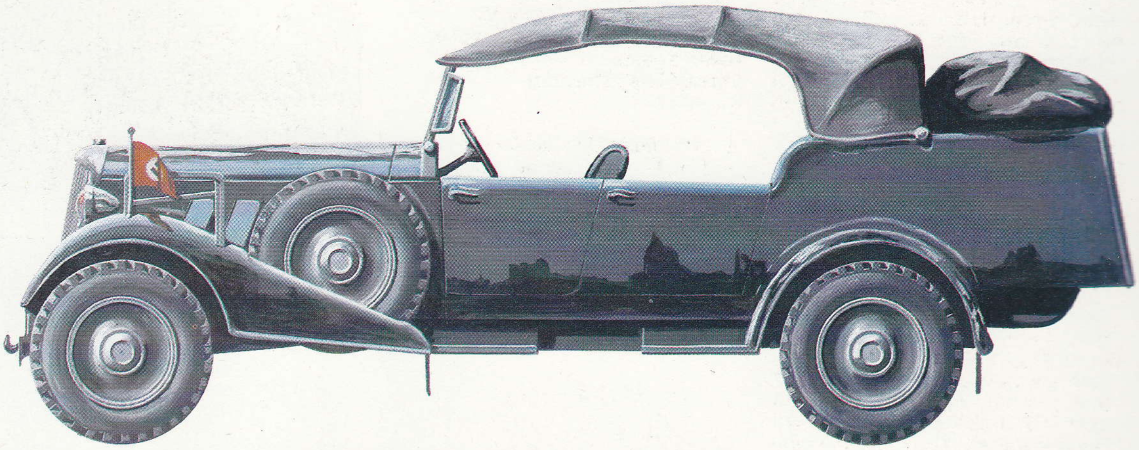
GERMANY

Kraftfahrzeug 11 (Auto-Union/Horch Typ 830)

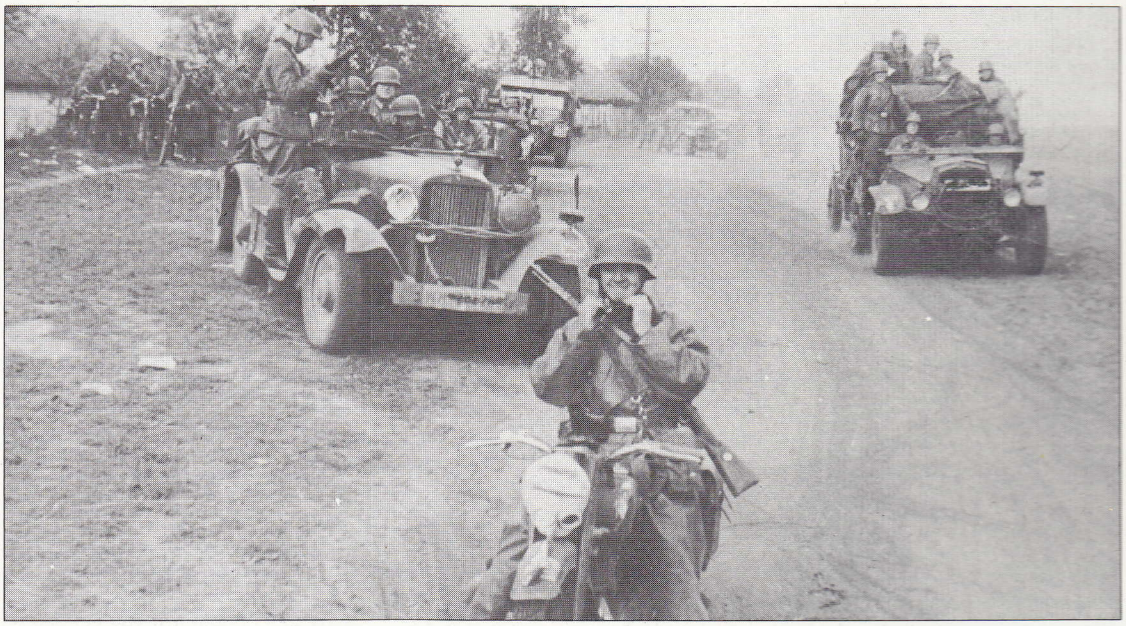
Before the introduction of the standard (*Einheit*) vehicles, the German army made extensive use of commercial cars as a means of motorizing the various arms and services. The **Auto-Union/Horch Typ 830** was one of the many commercial passenger car chassis fitted with various military bodies between the late 1920s and early 1930s. V-8 powerplants with a capacity of 3, 3.2 and 3.5 litres were installed. Since only the rear wheels were driven, larger tyres and different rear-axle ratios helped to increase the types' cross-country performance. The vehicles saw action in most theatres of war, the majority of them fitted with open superstructures and used as prime movers for light infantry guns, as well as radio communications vehicles. The signal troops also used a variety of enclosed van-type bodies. The **Kfz 11** was a closed-bodied communications or radio vehicle based on this chassis with two seats and a boot. The closed body was often made of wood. Later production models were fitted with sheet-metal doors and removable side windows. Eventually production was discontinued in favour of the medium standard cross-country personnel carrier built from 1937 onwards by Horch and, after 1940, by Opel.

Specification

Kfz 11 (Auto-Union/Horch Typ 830)
Dimensions: length 4.80 m (15 ft 9 in); width 1.80 m (5 ft 11 in); height 1.85 m (6 ft 1 in); wheelbase 3.20 m (10 ft 6 in)
Weight: net 990 kg (2,183 lb)
Powerplant: one Horch V-8 2.98-litre petrol engine developing 70 bhp (52.2 kW)
Transmission: ZF Aphon with four forward and one reverse gears
Tyres: 6.0×18 (metric)



The Horch Typ 830 was one of many commercial designs fitted with military bodies in the 1930s. Originally used as a troop carrier and radio car, the vehicle saw action in most theatres.



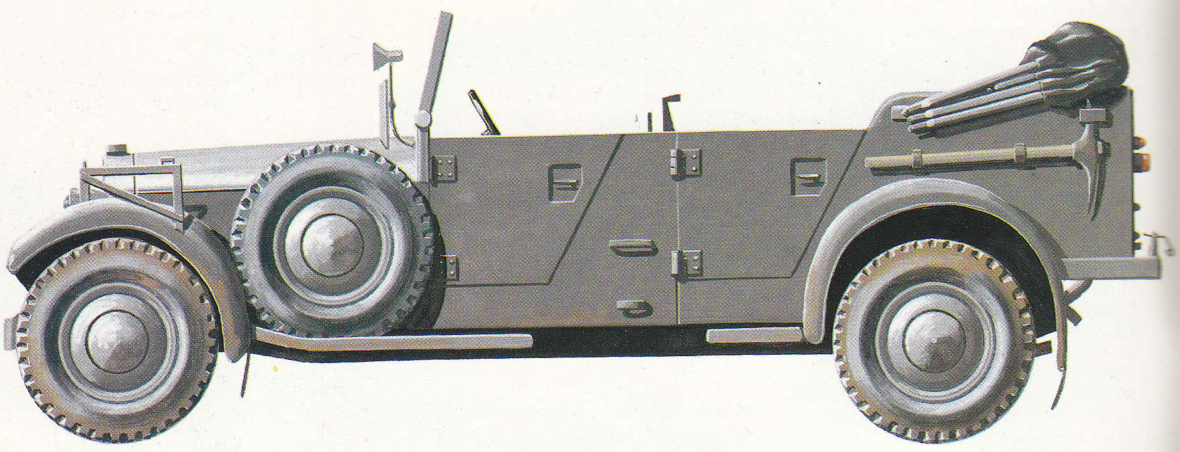
The Kfz 11 saw action in Poland as a personnel carrier. Infantry who were not lucky enough to get places in the cars or trucks had to make do with bicycles or their own two feet.

GERMANY

Kraftfahrzeug 15 (Mercedes-Benz 340)

The **Kfz 15 mittlerer geländegängiger Personenkraftwagen** (m.gl.Pkw, or medium cross-country personnel carrier) was used as a communications (*Fernsprech*) or radio (*Funk*) car. It had an open 4-seater body and a boot, and it was fitted with a towing hook. The vehicle was powered by a V-8 engine. Commercial chassis used for this role were: in 1933-8 the Horch 830 and 830B1, in 1937-9 the Wanderer W23S, and in 1938-40 the **Mercedes-Benz 340**.

The Mercedes-Benz 340, a larger version of the 320, was powered by a 3.5-litre engine and had a very long wheelbase, which tended to impair its cross-country performance. Like the Kfz 11 described above, production of this vehicle was discontinued in favour of the medium standard (*Einheit*) cross-country personnel carrier. This latter vehicle differed basically from the light model (described under Kfz 2, or Stöwer 40) in that the rear wheels were not steerable. As before, however, all-wheel-drive was used. The chassis was a conventional type used for staff cars, radio vehicles and other specialized types. Depending upon the manufacturer, the engine had a swept volume of between 2.9 and 3.5 litres. Horch engines were standard for most models, the few exceptions being equipped with an Opel type.



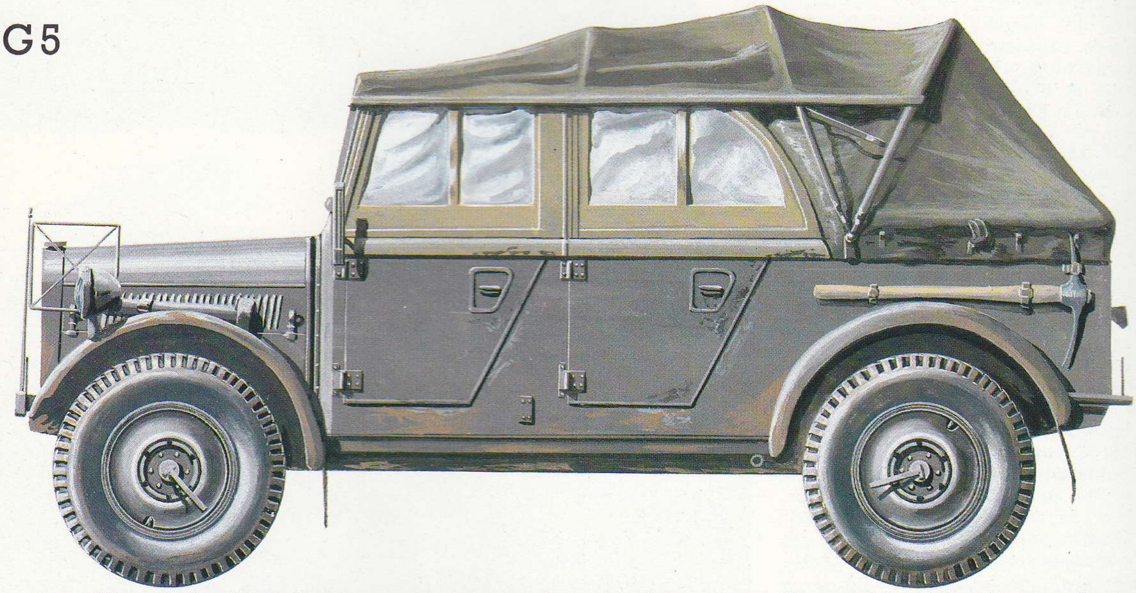
Above: The Mercedes-Benz 340 was not the ideal vehicle upon which to base the Kfz 15 body, as the long wheelbase impaired cross-country ability in spite of four-wheel drive. Even so, many were used as radio cars, staff cars and other special types.

Right: The fall of Tobruk in June 1942 was a shock to the British, and soon the town square was filled with a motley collection of Afrika Korps vehicles, including this Mercedes 340 ambulance.

Specification
Kfz 15 (Mercedes-Benz 340)
Dimensions: length 4.44 m (14 ft 7 in); width 1.68 m (5 ft 6 in); height 1.73 m (5 ft 8 in); wheelbase 3.12 m (10 ft 3 in)
Weight: net 2405 kg (5,302 lb)
Powerplant: one Mercedes-Benz 6-cylinder petrol engine developing 90 bhp (67.1 kW)
Transmission: four forward and one reverse gears
Tyres: 6.5×20 (metric)

GERMANY

Daimler-Benz G 5



A powerful vehicle, with four-wheel drive and four-wheel steering, the Daimler-Benz G5 was designed as a private venture to meet the Wehrmacht Einheit *specification. Few of the 378 built actually saw army service.*

During 1925-6 the first proposals were considered for the development of specialized vehicles for the Reichswehr (predecessor of the Wehrmacht). Among others, a requirement was laid down for a fully cross-country personnel carrier. This was to have six seats and use a six-wheeled chassis with more than one driven axle. The development of such a vehicle was taken up by the firms of Horch-Werk AG of Zwickau, Daimler-Benz AG of Stuttgart and Selve Automobilwerk AG of Hamelin, each of them supplying several models for trial purposes. The first Daimler-Benz model, designated **Daimler-Benz G 1**, several of which were produced between 1926-8, were powered by a 50-hp M03 6-cylinder engine. This had the drive taken to the four rear wheels. The unladen weight was 1200 kg (2,645 lb), and the payload was 1000 kg (2,205 lb). Daimler-Benz alone continued development of the three-axled personnel carrier. Between 1933 and 1934 it produced a small number of its **G 4** model. This was a vehicle widely known for its use by Hitler, although it was never suited to military usage. It had a poor cross-country performance and was too large, too heavy and too expensive. Between 1933 and 1934 57 were built and these were almost exclusively employed by high officials of the Nazi party and the general staff; one was modified as a communications vehicle for use by Hitler during his field trips. With the development of the *Einheit* series of personnel carriers, Daimler-Benz, which appears to have been neglected in the share-out of production contracts for these vehicles, prepared a model of its own as a private venture. The **Daimler-Benz G 5** was basically orientated to the production model by Auto-Union AG. Between 1937 and 1941 378 were built, although only a few were actually adopted by the Wehrmacht. The vehicle had four-wheel drive and steering. A few were fitted with elaborate superstructures for desert travel.

Specification
Daimler-Benz G 5
Dimensions: length 4.52 m (14 ft 10 in); width 1.70 m (5 ft 7 in); height 1.80 m (5 ft 11 in); wheelbase 2.79 m (9 ft 2 in)
Weight: net 1630 kg (3,593 lb)
Powerplant: one Mercedes-Benz 6-cylinder petrol engine developing 90 hp (67 kW)
Transmission: five forward and one reverse gears
Tyres: 5.50×18 (metric)

Development and Production

In spite of its best efforts, there was no way in which German industry could match the enormous manufacturing power of the Allies, in particular that of the United States. With US vehicles pouring in, the Allies could concentrate on producing weapons and munitions with which to fight the Axis.

The Polish campaign saw a proportion of motorized troops uniformly mounted (on Krupp Kfz 81s, in this case). As war continued German manufacturers could not cope with demand.

Allied

During the intensive mechanization of the British army from the mid-1920s to the outbreak of World War II, the War Office developed a preference for the 6×4 lorry and three classes were adopted: light, medium and heavy, with load capacities of 30 cwt, 3 tons and 10 tons respectively. By 1925 provisional specifications for the light and medium classes had been prepared and these were finalized in 1927. These two classes were intended to form the backbone of army transport and the War Office, through the War Mechanisation Board, took every step to encourage the vehicles' commercial use. In 1938 the Guy and Morris-Commercial 4×4 'Quads' became standard field artillery tractors.

Mechanization of the infantry formed a major part of the programme. During 1936, after lengthy trials, it was decided that the infantry should be basically equipped with 15-cwt 4×2 vehicles built to a GS (General Service) specification, but making the fullest possible use of commercial components in normal use. The reason for the shortage of British-built load-carrying vehicles throughout the war stemmed mainly from the philosophy of the 1937 rearmament planning. The estimation of requirements was based on the assumption that the quantities of vehicles considered necessary for the first year of emergency were: 3-ton six-wheelers 13,956; 3-ton four-wheelers 10,955; 30-cwt six-wheelers 14,416; 30-cwt four wheelers 10,451; and trucks and vans 11,797.

This totalled 61,575, of which the army was to receive 54,128 with an additional 463 for India. It was considered that existing manufacturing capacity for vehicle production was more than adequate to meet these requirements (with the exception of six-wheelers). No action was taken until the spring of 1939, when a significant expansion in the size of the British army was authorized. The result was that what had appeared to be surplus manufacturing capacity was surrendered to the production of other munitions. Two of the three largest manufacturers of motor vehicles (Austin and Ford) were not involved in production of load-carrying vehicles for the rearmament programme, and it was not until 1939 that the production capacity of these firms was utilized. Vauxhall Motors, however, were included, and the pre-war planning did incorporate a degree of standardization by the fact that this firm was to manufacture the bulk of 3-ton and 30-cwt four-wheeled vehicles, and Morris-Commercial Cars was to provide all 30-cwt six-wheelers and the bulk of 15-cwt trucks. Standardization did, however, disappear in 1939 when the increase in types and quantities required made it necessary to incorporate the outputs of every available manufacturer. The immediate effect of the underestimation of vehicle requirements was the false assumption that requirements could be met easily from normal commercial production. When a huge increase in demand for munitions arose in 1939, therefore, British industrial capacity was not sufficient to meet it, and it became necessary to concentrate upon the essential munitions, among which transport vehicles were not included until late in the war. At no stage during the course of the war was it possible to recover for vehicle production the factories that had been redistributed to other tasks. Hence the utter dependence of the UK upon US production during the war.

During World War II the United States Army was better able than ever before to move rapidly along roads and across country. It purchased more than 3½ million motorcars and trucks, and in the European theatres in 1945 there was about one truck for every four men. To this must be added the immense quantity of trucks and Jeeps provided to other Allied armies under Lend-Lease (particularly the UK and USSR). After the entry of the USA into the war (July 1942) the War Department circular 245 formally announced the transfer of responsibility for transport vehicles from Quartermaster to Ordnance, including all research and development, procurement, storage, maintenance and distribution. The experience of World War I had clearly revealed the need for rugged army trucks that could operate over the worst of roads, ford shallow streams, and be easily repaired in the field. It had shown the value of the four-wheel drive and the need for a four-speed transmission, maximum ground clearance, towing hooks and pintles, sturdy bumpers and radiator guards, electric lights, and many other features. But most of all it had shown the need for standardization and an improved system for providing spare parts. The development of the situation to the time of the US entry into the war is a lengthy story in itself and cannot be related here. Most of the production problems of the Quartermaster Corps stemmed from the fact that army trucks with all-wheel drive required three vital components not used to any great extent in commercial vehicles, namely constant-velocity joints, transfer cases and rear-axle bogies. Pearl Harbor resulted in the USA taking drastic action to convert to all-out war production. The newly found War Production Board, in January 1942 issued orders banning all further production of vehicles for civilian use. In 1942 the Automotive Council for War Production was founded, headed by A. Macauley of Packard. In March an Army Supply Program (ASP) was drafted calling for the production of more than three million vehicles of all types by July 1944, half of them heavy and half of them light. The US automobile industry achieved a miracle of production achievement despite a mountain of complex problems and material shortages, and a level of standardization envied by all other Allied armies as well as the German forces.

The Soviet Union, as the result of colossal losses during the initial campaigns, the need to evacuate industry eastwards and the massive tank production quotas that had to be met, relied almost entirely upon US Lend-Lease aid for military transports. Towards the end of the war, when armoured vehicle production could be slackened and manufacture of transport vehicles undertaken, the models produced were almost totally based on US designs, such as the GAZ-67 four-wheeled field car and the ZIS/ZIL six-wheeled trucks.

Axis

The development of German army transport vehicles is extremely interesting, for it demonstrates how that which may appear good in theory does not necessarily give good results in practice. Right from the start, very thorough steps were taken to standardize basic types with a minimum of parts and accessories; but strangely enough, their attributes were overcast by their disadvantages. Standardization tended to hamper evolution and proved expensive and complex. The result was that nowhere near the desired quantity of such 'standardized' vehicles could be produced, and the army had to supplement them (sometimes up to 70 per cent) with captured and commercial models. Inevitably, great problems arose in spare-part procurement and vehicle maintenance.

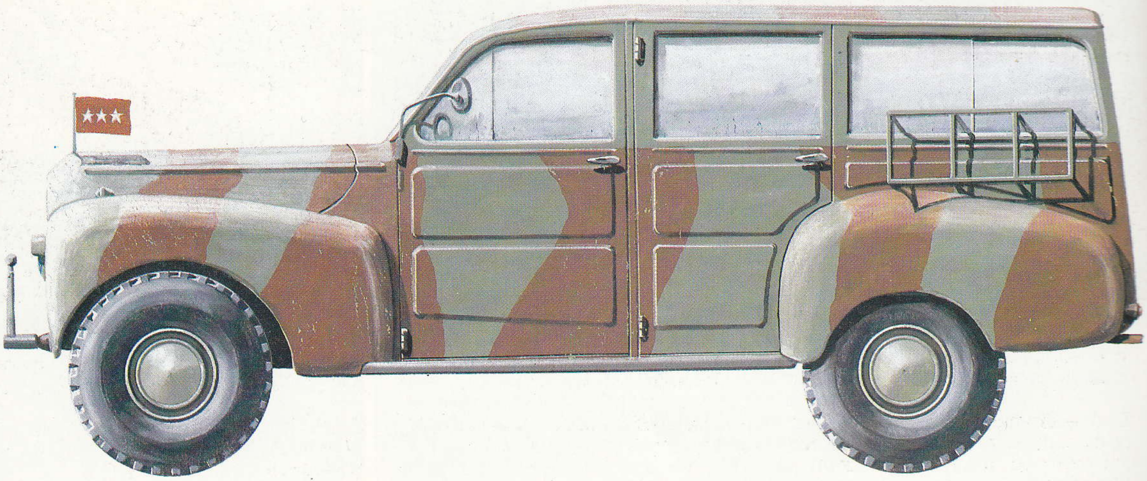
It was not until 1938-9 that General von Schell introduced his own standardization plan, which in contrast to the earlier concept, relied solely on commercial models already available, or on slight modifications of them. As the result the multiplicity of commercial models that had been coming on to the market before 1939 was reduced to a more tolerable level, and all vehicles were produced as either an A-Typ (all-wheel-drive model) or an S-Typ (rear-wheel-drive model) with the capability of conversion from one to the other. The drastic measures taken to reduce the variety of vehicles resulted in the eventual replacement of military personnel carriers (cars) by a single model, the military version of the Volkswagen, known as the Volkswagen Kübel.

In Italy by far the most important supplier of transport vehicles was the Fiat company. Military cars were either in standard form or as Torpedo Militare. Like the Germans, the Italians had had an extensive military vehicle development programme before the war and many opportunities for tests, such as Ethiopia, the Spanish Civil War and Albania. In general Italian vehicles were automotively very good and very reliable. The Italians pioneered some fairly revolutionary vehicles including the OM Autocarretta 32, which was a similar type to the current US Mule, being a very light and highly mobile load carrier for use by the infantry.

For a long time the Japanese army depended on foreign supplies for its unarmoured vehicles, principally the USA. In 1931 the Motor Industry Industrial Establishment committee was set up. Specimen foreign vehicles were purchased which were handed over to Japanese manufacturers for thorough investigation. By 1939 Japan had established its own military motor industry and in 1941 reached the peak of its pre-war production with some 45,000 vehicles, about half of which were for military use. With the advent of war with the Allies all Japanese motor manufacture was placed under the direction of the army with massive concentration upon military trucks. In addition to its own vehicles, the Japanese army used large numbers of captured US and Commonwealth cars and trucks. The greatest achievement of the Japanese motor industry during World War II was the development of military diesels.

CANADA

Car, Heavy Utility, 4×2, Ford C 11 ADF



The Ford C 11 ADF Heavy Utility Car was a commercial Canadian vehicle, based on the 1942 Ford Fordor Station Wagon, adopted for military use with only minimal changes. Canadian Ford produced the vehicle mainly for the British army, although several were used by the Canadian army. The type used extensively in the Western Desert and Italy by HQ staffs. The military version had right-hand drive (for the UK), heavy-duty tyres, black-out equipment, simplified and strengthened bumpers, internal rifle racks, a map-container, first-aid and medical kit, radio-interference suppression, fire-extinguishers, entrenching tools and other standard fittings, including a removable roof rack. In addition to the driver the all-steel body had seating for five passengers, two in front and three on the single bench-type rear seat. Access was via four doors. In addition there was a full-width rear door split horizontally and hinged top and bottom so that the lower portion formed a tailboard.

A similar vehicle, seating seven passengers and designated **Ford C 11 A 5**, was also used, this having lighter tyres and axles and making use of the luggage space for the additional two seats.

Another Ford Heavy Utility Car was essentially the same as the C 11 ADF but based on the 1941 production chassis. Weighing 91 kg (200 lb) more than its predecessors, this variant had a slightly different estate car body and front radiator grill. Some of these vehicles had roof hatches added and jerry and water can racks fitted externally.

Specification

Car, Heavy Utility, 4×2, Ford C 11 ADF
Dimensions: length 4.93 m (16 ft 2 in); width 2.01 m (6 ft 7 in); height 1.83 m (6 ft 0 in); wheelbase 2.90 m (9 ft 6 in)
Weight: net 1814 kg (4,000 lb)
Powerplant: one Ford mercury V-8 3.91-litre petrol engine developing 95 bhp (70.8 kW)
Transmission: three forward and one reverse gears
Tyres: 9.00×13 for C 11 ADF, and 6.00×13 for C 11 AS

Heavy utility cars were of two major types, those of military design and those converted from civilian models. The C 11 was developed from a commercial station wagon model, and was used extensively in the right-hand drive version by the British, in a variety of roles, and equipped HQ Staffs in Italy and the Desert.

USA

Truck, ½-ton, 4×4, Weapons Carrier, Dodge T207-WC3

US Army ½-ton trucks were provided by a number of manufacturers including Dodge, Chevrolet, Diamond T, Ford, Marmon-Herrington and GMC. The ½-ton 4×4 vehicle was originally developed by the Marmon-Herrington Company of Indianapolis in July 1936. During the early stages of the war most of the ½-ton 4×2 vehicles were slightly modified civilian models and were retained for the home front. With the development of the war, standard tactical chassis began to be adopted to supersede these earlier models. As regards the **Truck, ½-ton 4×4**, Chrysler's Dodge Division began mass-production during 1939. The original **T202** series used many commercial components, and 4,640 of all types were manufactured by Dodge, most of them as command reconnaissance cars and light trucks. The **Truck, ½-ton, 4×4, Weapons Carrier, Dodge T207-WC3** was introduced in 1941, and replaced all previous models then in use. It became one of the basic transportation means for all arms and services. The vehicle was open-topped with dismountable bows and a canvas tilt. As with most other Dodge trucks, a spare wheel was carried on the offside of the vehicle.

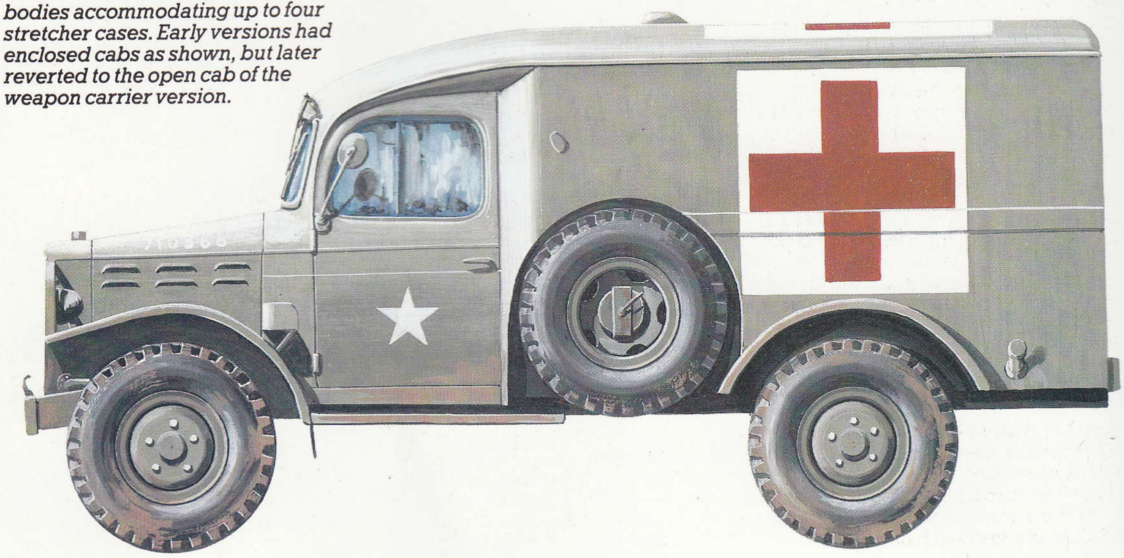
Specification

Truck, ½-ton, 4×4, Weapons Carrier, Dodge T207-WC3
Dimensions: length 4.60 m (15 ft 1 in); width 1.93 m (6 ft 4 in); height 2.24 m (7 ft 4 in); wheelbase 2.95 m (9 ft 8 in)
Weight: net 2014 kg (4,440 lb)
Powerplant: one Dodge 6-cylinder petrol engine developing 85 bhp (63.4 kW)
Transmission: four forward and one reverse gears
Tyres: 7.50×16

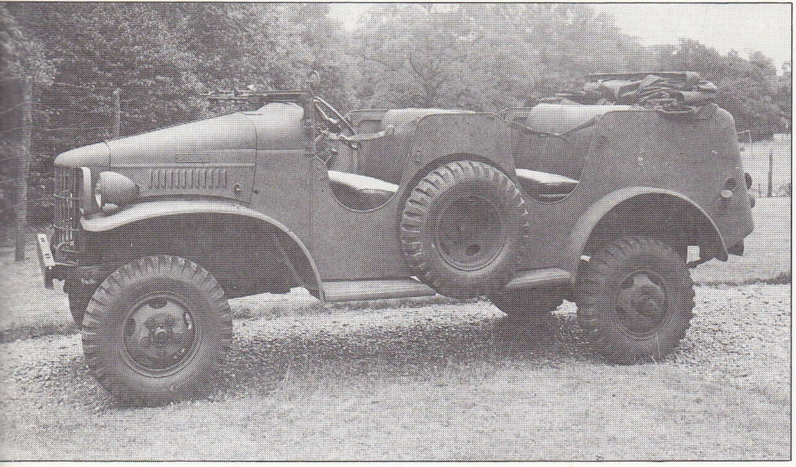
USA

Truck, ½-ton, Ambulance, 4×4, Dodge T215-WC27

In the ½-ton range Dodge was the sole producer to US Army contracts. The first contract for 14,000 ½-ton 4×4 trucks was placed with Dodge in mid-1940. The basic chassis was a slight modification of the normal commercial vehicle to incorporate a new transfer gearbox and forward transmission to cater for the four-wheel drive requirement. The basic chassis was employed for numerous roles including command, command reconnaissance, radio, weapons carrier and **Truck, ½-ton, Ambulance, 4×4, Dodge T215-WC27**. Depending upon the role, they had the option of a fixed bodywork or open cab. The ambulance version had the former and the command, command reconnaissance, radio and weapons carrier versions, the latter. These earlier US military pattern 4×4 trucks were superseded in 1942 by a range of wider and more robust body types (¾-ton) with a lower silhouette and shorter wheelbase, also built by Dodge. By this time 82,000 ½-ton trucks had been built. These left-hand drive vehicles were built by the



Dodge trucks were adapted to serve as ambulances, with sheet steel bodies accommodating up to four stretcher cases. Early versions had enclosed cabs as shown, but later reverted to the open cab of the weapon carrier version.

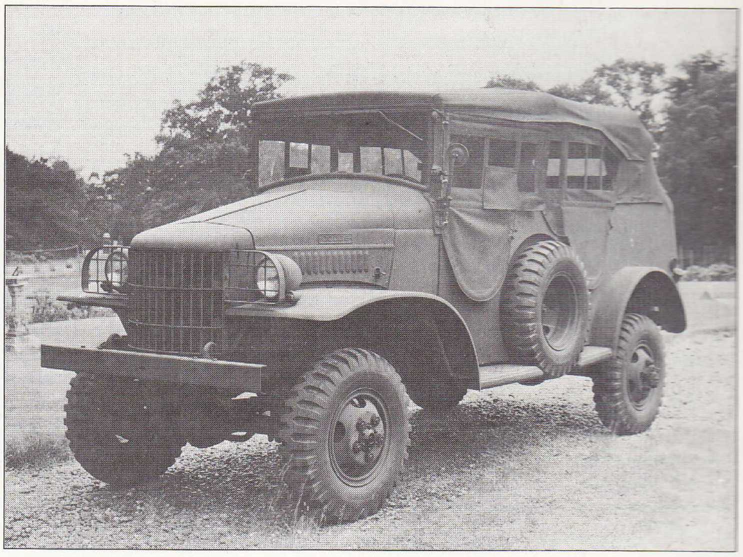


A ½-ton Dodge 4×4, the T215 model, preceded the ¾-ton T214 in 1941. It was at this time that the Dodge division of Chrysler became the large-scale producer of such vehicles for the US forces.

Dodge Brothers Corporation Division of the Chrysler Corporation of America and also, in a modified form, in Canada. The **International M-1-4** range was similar in layout but produced solely for the US Marine Corps and US Navy. A great number of these Dodge ½-ton trucks were supplied to the UK and the USSR under the Lend-Lease programme.

Specification

Truck, ½-ton, Ambulance, 4×4, Dodge T215-WC27
Dimensions: length 4.67 m (15 ft 4 in); width 1.93 m (6 ft 4 in); height 2.13 m (7 ft 0 in); wheelbase 2.95 m (9 ft 8 in)
Weight: net 2046 kg (4,510 lb)
Powerplant: one Dodge T215 6-cylinder petrol engine developing 92 bhp (68.6 kW)
Transmission: four forward and one reverse gears
Tyres: 7.50×16



The Dodge T215 WC 23 was a ½-ton command and reconnaissance vehicle of the same family as the T207. The 1941 pattern vehicles are identifiable from the heavier 1942 models by their sloping bonnet.

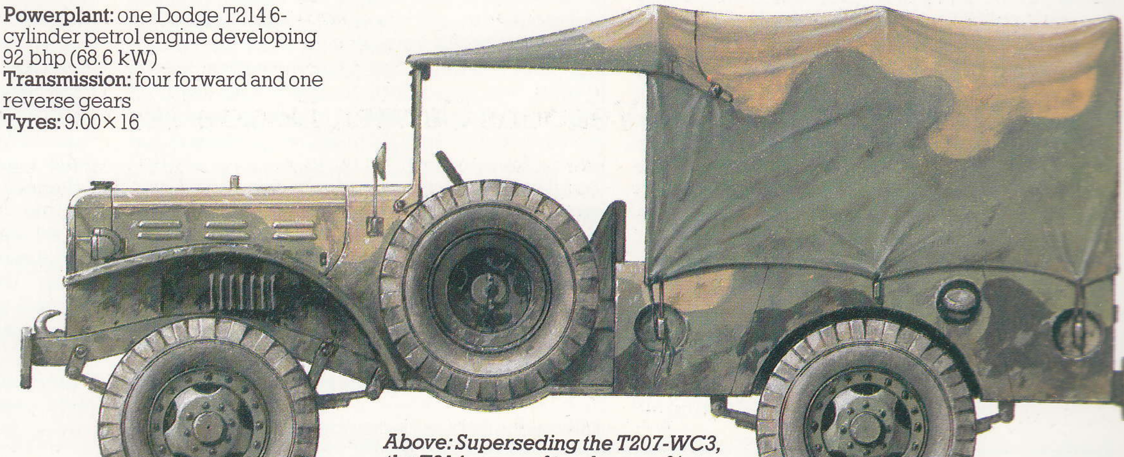
USA

Truck, ¾-ton, 4×4, Command Reconnaissance, Dodge T214-WC56

Introduced during 1942, the **Dodge ¾-ton 4×4** range of light trucks superseded the original ½-ton 4×4 range. Both Ford and Dodge, previously the main suppliers of ½-ton 4×4 vehicles, each produced prototypes for US Army evaluation: these were slightly wider and lower than their predecessors, had larger wheels and tyres, and possessed stronger suspensions. The Dodge version was selected and officially introduced during June 1942 when production started into full swing. As with the ½-ton vehicles there were several special body types. The **Dodge T214** series comprised the **WC51** weapons carrier, **WC52** weapons carrier with winch, **WC53** general-purpose and field command vehicle, **WC54** ambulance, **WC55 37-mm Gun Motor Carriage M6**, **WC56** command reconnaissance vehicle, **WC57** command reconnaissance with winch, **WC58** radio vehicle, **WC59** light maintenance and installation vehicle, **WC60** emergency repair vehicle, **WC61** telephone maintenance and installation vehicle, and **WC64** ambulance. Generally, the vehicles in this series were referred to as 'Beeps' (contraction of Big Jeeps). The WC51 weapons carrier was used principally to transport personnel, weapons, tools and other equipment. It had an open body with a canvas tilt and canvas side-screens. The WC53 was fitted with a 'safari' type body with rear side doors, a map table, special seats and internal lighting. The WC56 command reconnaissance was the most common variant, and was used for reconnaissance and liaison, and as a staff car for high-ranking officers. It was fitted with map-boards and had a detachable canvas top and side-screens.

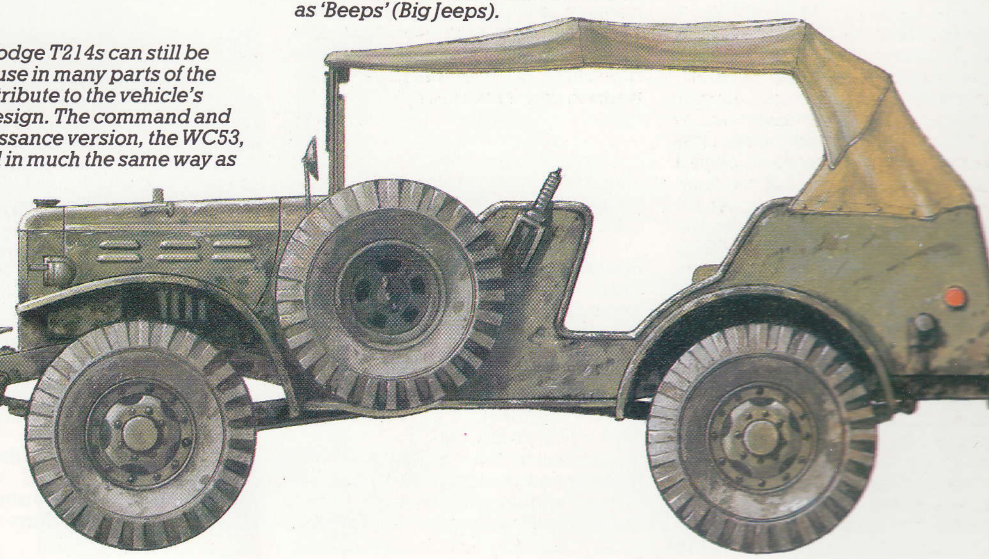
Specification

Truck, ¾-ton, 4×4, Command Reconnaissance, Dodge T214-WC56
Dimensions: length 4.24 m (13 ft 11 in); width 1.99 m (6 ft 6.5 in); height 2.07 m (6 ft 9.5 in); wheelbase 2.49 m (8 ft 2 in)
Weight: net 2449 kg (5,400 lb)
Powerplant: one Dodge T214 6-cylinder petrol engine developing 92 bhp (68.6 kW)
Transmission: four forward and one reverse gears
Tyres: 9.00×16



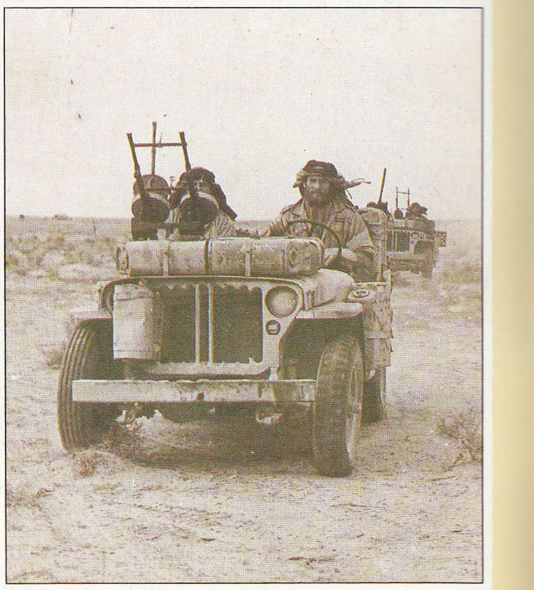
Above: Superseding the T207-WC3, the T214 range of trucks were ¾-ton vehicles. Introduced early in 1942, they were in full production by June. Used to transport personnel, weapons, tools and equipment, the T214 range were sometimes known as 'Beeps' (Big Jeeps).

Below: Dodge T214s can still be found in use in many parts of the world, a tribute to the vehicle's sturdy design. The command and reconnaissance version, the WC53, was used in much the same way as the Jeep.



The Jeep in Action

An ugly duckling that never grew into a swan, the Jeep nevertheless became one of the most influential vehicles in history. A go-anywhere utility vehicle, spartan but simple, the Jeep could be found wherever Allied forces campaigned. From the jungles of the Pacific islands to the arid wastes of North Africa, from the frozen steppes of the USSR to the army camps of middle America, the Jeep was there.



The go-anywhere ability of the Jeep was much appreciated during the desert campaign. Here members of the newly-formed SAS set out in their Vickers- and Browning-armed Jeeps.

During the second half of the 1930s several experimental US military multi-purpose vehicles were called 'Jeep', after the Popeye cartoon character, particularly the 2½-ton Dodge command Reconnaissance Car, while the original ¼-ton vehicle (which eventually became the Jeep) was referred to as 'Peep' and its later amphibious version as the 'Seep' (a contraction of Sea Jeep). From 1942 onwards, however, the name Jeep was adopted for the ¼-ton 4×4, regardless of make or type.

The Jeep may be classed as one of the world's most famous military vehicles. It was developed to meet a long-standing military requirement for a light four-wheel drive general-purpose vehicle and reconnaissance car. In the US Army the Jeep fell into an additional load category, ¼-ton, which had not been allowed for when the original five basic classes of military vehicle were defined. The original designation 'Command Reconnaissance' was later changed to 'Utility'. In June 1940 the US Army drafted a specification for a 'go-anywhere' field car which was submitted to 135 manufacturing centres for tender. Initially, only two of these responded: the American Bantam Car Company of Butler, Pennsylvania, and Willys-Overland of Toledo, Ohio. Prototypes were delivered for test by both of these companies in late 1940, by which time Ford also had been drawn into the programme.

There has been a great deal of controversy over who should take the credit for the origin of the Jeep. The truth is that it evolved through the combined efforts of several motor and subsidiary component manufacturers. The original Bantam prototype, using components from the company's small pre-war runabout car, was completed within 50 days. Representatives of the US Ordnance Technical Committee visited the Bantam Plant and studied its product, and an order was placed for 70 pre-production vehicles, eight of which were to have four-wheel steering. Built to US Army specifications, these cars were purely military vehicles. Only 3.35 m (11 ft) long and 0.91 m (3 ft) high, they were powered by a 45-hp (33.6-kW) 4-cylinder Continental engine and weighed 907 kg (2,000 lb), about half as heavy again as the original maximum weight. After successful tests of the Bantam vehicles the US Army was ready to buy Jeeps in quantity, and directed the Quartermaster General to procure 1,500. In March 1941 Bantam received a £1.75 million contract for 1,500 production vehicles of the improved Model 40, but Major General E.B. Gregory was reluctant to place the entire order with Bantam, describing it as 'a small firm with no productive facilities of any importance'. As Willys and Ford had meanwhile shown considerable interest in producing such a vehicle, and were then building pilot models, the Quartermaster Corps (QMC) was permitted to place the contract with Bantam in November and soon thereafter to make similar awards to Willys-Overland and Ford. As the result, in July 1940 Willys-Overland received an order to produce 70 examples of the pre-production vehicle, then referred to as the 'Quad'. The first completed vehicle was delivered to the US Army in November 1940. Willys redesigned the Quad to reduce weight, resulting in the MA model, and 1,500 were built from November 1940. Ford delivered its version, referred to then as the 'Pygmy', in November 1940, and received a $1.4 million contract in December for 1,500 vehicles of lightly improved type (designated GP). After rigorous tests of Bantam, Willys and Ford Jeeps, tests that revealed structural weaknesses in all three and led to many design changes, the Willys model was selected as the most suitable, subject to minor modifications, and designated Model MB. When the QMC was authorized to procure 16,000 vehicles it called for bids on an 'all-or-nothing' basis. Although Willys submitted the lowest bid, by a narrow margin, the QMC preferred Ford as a larger and more dependable producer, and recommended that it be given the contract. But when the Office of Production management refused to go along with this recommendation, the contract went to Willys in July 1941.

A few months later, however, when Willys proved unable to keep pace with fast-moving requirements, another producer had to be

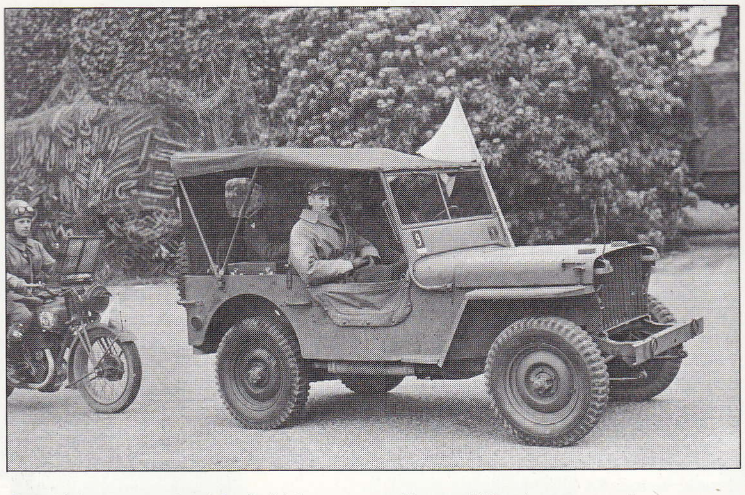
USA

Truck, ½-ton, Utility, 4×4, Jeep

The development of this vehicle (and its variants) is described elsewhere in this issue. In general the **Jeep** had a conventional automobile layout with a Midland Steel ladder type chassis frame supporting major sub-assemblies: engine with gearbox, carburettor, distributor and radiator at the front; driver and forward passenger seats and controls in the centre; and a full-width passenger seat at the rear. The engine was a Willys 441 or 442 'Go Devil' 4-cylinder inline side-valve (L-head) petrol unit developing 60 bhp (44.7 kW), and the transmission comprised a Warner Gear Model T-84-J gearbox 3-speed synchromesh (on second and top gears) which through a Spicer Model 18 transfer case (bolted on) provided six forward and two reverse speeds. The driver had a special front-axle drive engagement lever providing optional two- or four-wheel drive. There was provision for power take-off at the rear end of the gearbox mainshaft. Spicer U-joint Carden shafts carried the drive to front and rear axle bevel drives. Steering was provided by twin steering track rods. Hydraulic telescopic shock-absorbers were attached to all wheels. Suspension was by semi-elliptic leaf springs (front and rear) with U-shackles and screwed bushes. The electrical system comprised a 6-volt battery. Desert equipment included a radiator surge tank, a power-driven air compressor, a low-temperature tyre gauge, a 7.6-cm (3-in) copper fin radiator, and a fuel filter, relocated to minimize vapour lock.

Specification

Truck, Utility, ¼-ton, 4×4, Jeep
Dimensions: length 3.33 m (11 ft 0.25 in); width 1.57 m (5 ft 2 in); height 1.14 m (3 ft 9 in) to top of hood
Weight: net 1247 kg (2,750 lb)
Powerplant: one Willys 441 or 442 'Go Devil' 4-cylinder petrol engine developing 60 bhp (44.7 kW)
Transmission: Warner Gear T-84-J three-speed synchromesh giving six forward and two reverse gears
Tyres: 6.0×16 six-ply (mud and snow)



Dunkirk saw much of the British army bereft of equipment, and replacements had to be obtained quickly, which meant from the USA.

General Montgomery, who was commander of South Eastern Command, can be seen in an early example of American aid to Britain.

'Vinegar Joe' Stillwell commanded American forces in China and northern Burma, one of the less-known fronts of the war. Here Stillwell (holding the rifle in the leading Jeep) crosses a Burmese river.

added. Ford thus received contracts to produce the Willys vehicle exactly according to Willys blueprints. Willys turned over to Ford copies of its drawings, specifications and patents, and for the rest of the war the two firms turned out thousands of Jeeps with interchangable parts. Between them Willys and Ford turned out a total of 639,245 (Willys delivered 277,896). Both firms bought many of their major components from the same suppliers: frames from Midland Steel, wheels from Kelsey-Hayes, and axles and transfer cases from Spicer. The Ford production model was designated GPW.

Throughout World War II continuous improvements resulted in numerous modifications, as also did the requirement to operate under severe climatic conditions (desert warfare, the Eastern Front, the Far East, etc.) and the diversity of roles for which the Jeep became employed.

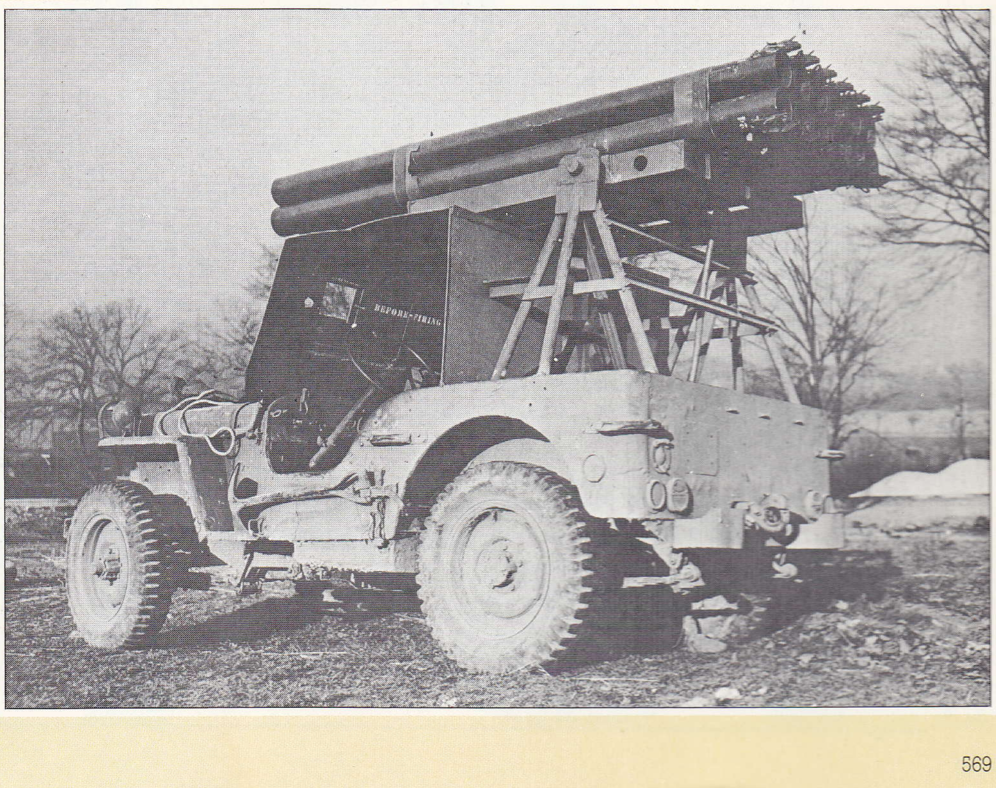
Since its initial development the Jeep has been assembled in 26 foreign plants. By 1950 the Jeep had evolved into the Model MC which became Truck, Utility, ¼-Ton, 4×4, M38. More than 60,000 of these were produced by the end of 1952, and the type was used extensively during the Korean War. In April 1953 Willys-Overland was taken over by Henry J. Kaiser Industrial Interests and eventually the former company became the Kaiser Jeep Corporation. The CJ series of Jeeps was then developed, evolving into the CJ-3B (Truck, Utility, ¼-Ton, 4×4 M606), the CJ-5 (Truck, Utility ¼-Ton, 4×4, M38A1), and CJ-6 (Truck, Ambulance, ¼-Ton, 4×4, M170). The current US Army model, designated Truck, Utility, ¼-Ton, 4×4, M151 (Mutt), and designed by Ford, is a complete redesign incorporating many modern engineering techniques.

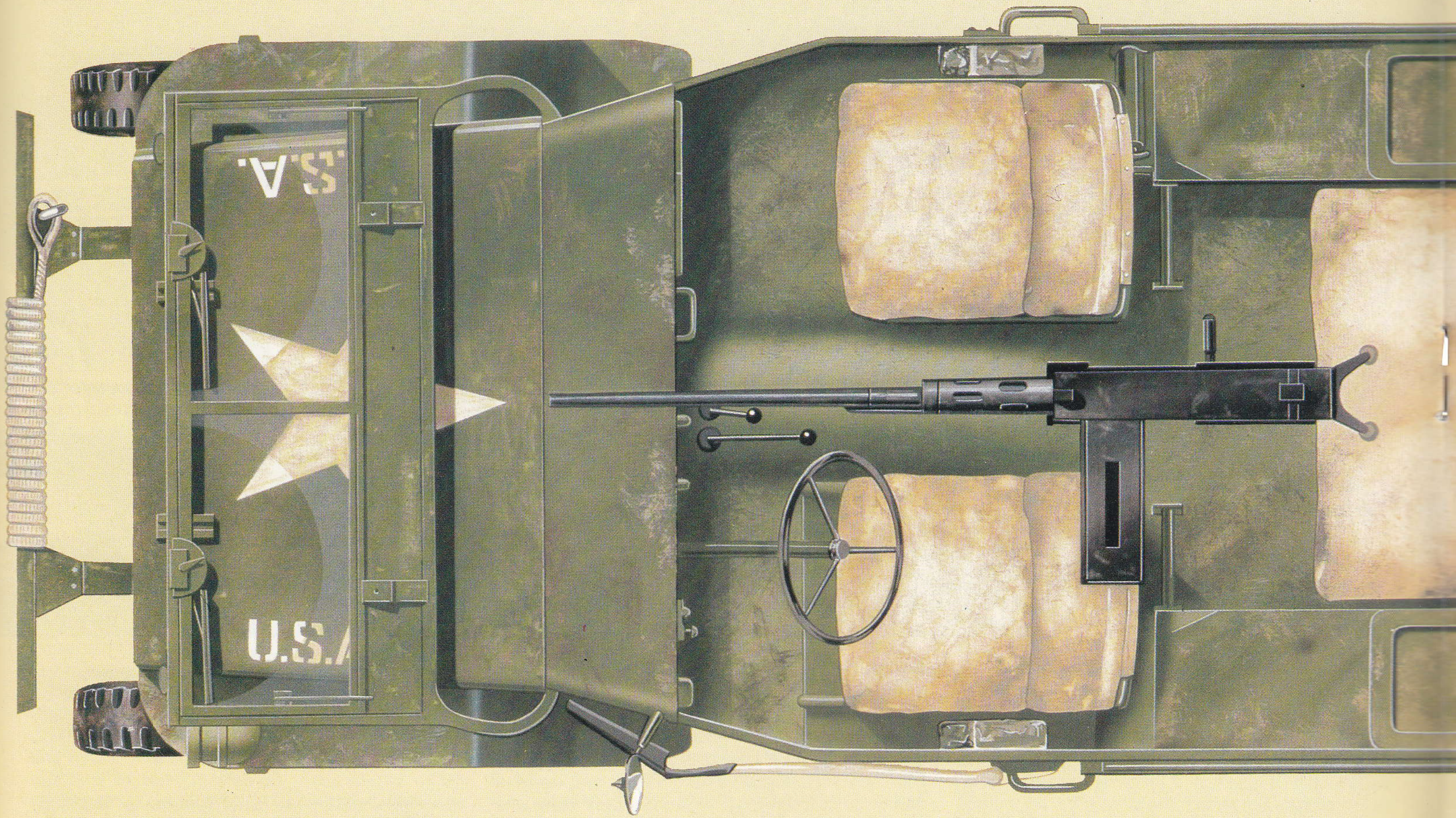
Variants

In service the Jeep was intended for reconnaissance and liaison duties, but it was soon found to be invaluable for other work. It could, for example, be carried in an RAF Airspeed Horsa glider. In 1943 Nuffield Mechanization & Aero Ltd in the UK produced a special airborne version called the Para Jeep with only two seats and a relocated battery, air-cleaner, oil filter, brake-fluid reservoir and horn. Willys produced the 'Stripped Jeep', commonly known as the Gipsy Rose Lee, for airborne purposes. Similar vehicles were manufactured by Chevrolet, Kaiser and Crosley, but none of these special airborne types actually went into production as a capability to airlift ordinary Jeeps was developed. The British developed a special airborne trailer (designated Trailer, 10 cwt, 2-wheel, Lightweight, GS Type) to increase the capability of transporting heavy weapons and equipment in airborne units. The combination could carry up to eight men.

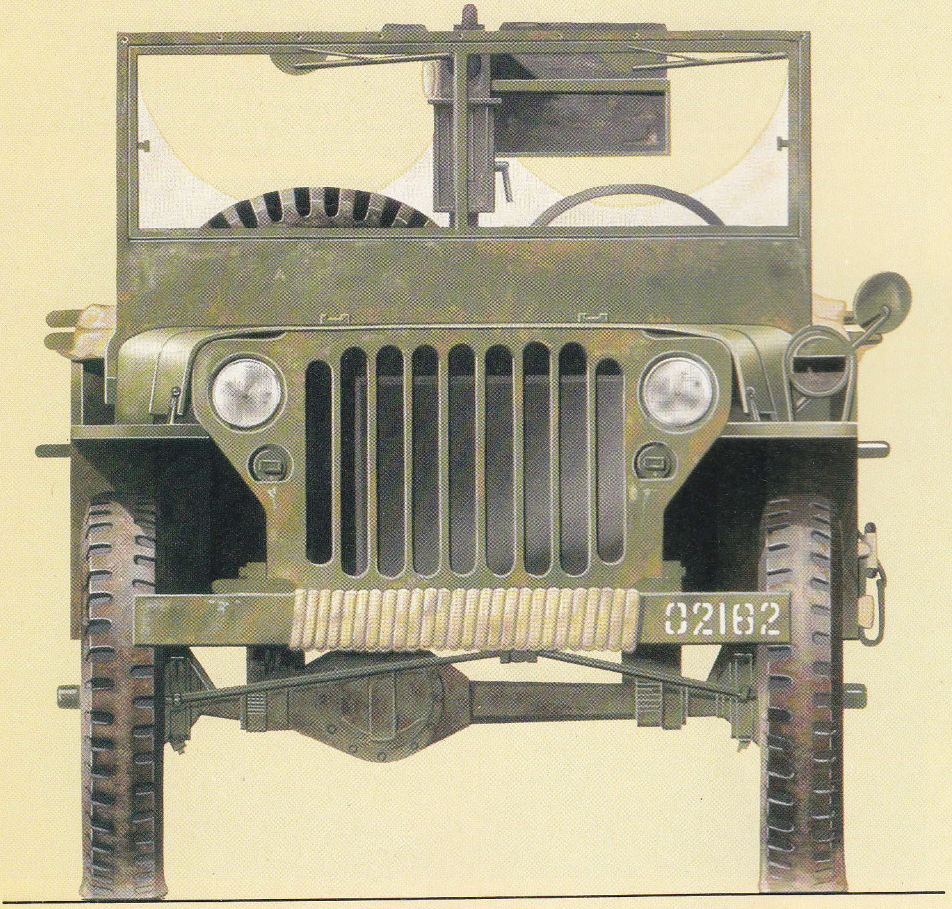
The Jeep was used by all arms for OP, Provost, wireless, recovery and cargo-carrying roles. Both the US and British armies used armed reconnaissance versions, and of particular interest were the special heavily-armed vehicles used by the SAS (Special Air Service) and LRDG (Long-Range Desert Group). These vehicles were stripped of all unnecessary equipment to allow for the attachment of special equipment, armament, fuel, water-cans, etc. The LRDG in particular carried out daring exploits in North Africa against the supply columns replenishing the Afrika Korps, and play-

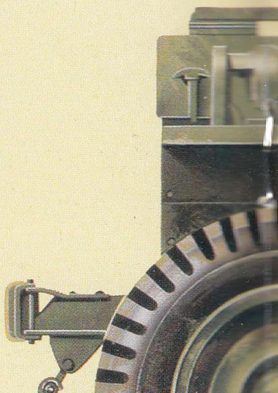
Jeeps were used in a variety of roles, and during 1944-5 some were modified as 4.5-in rocket-launchers along the lines of Soviet Katyushas and German 'Nebelwerfers'.

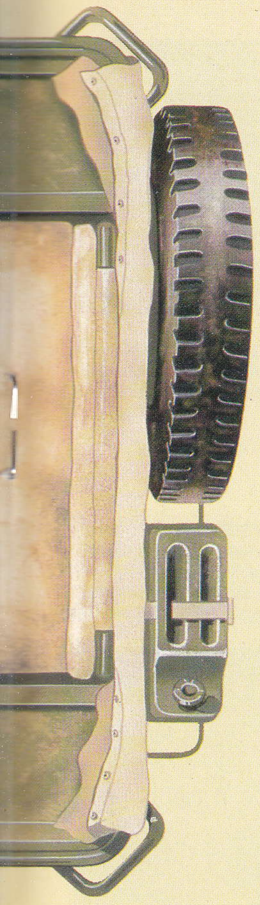


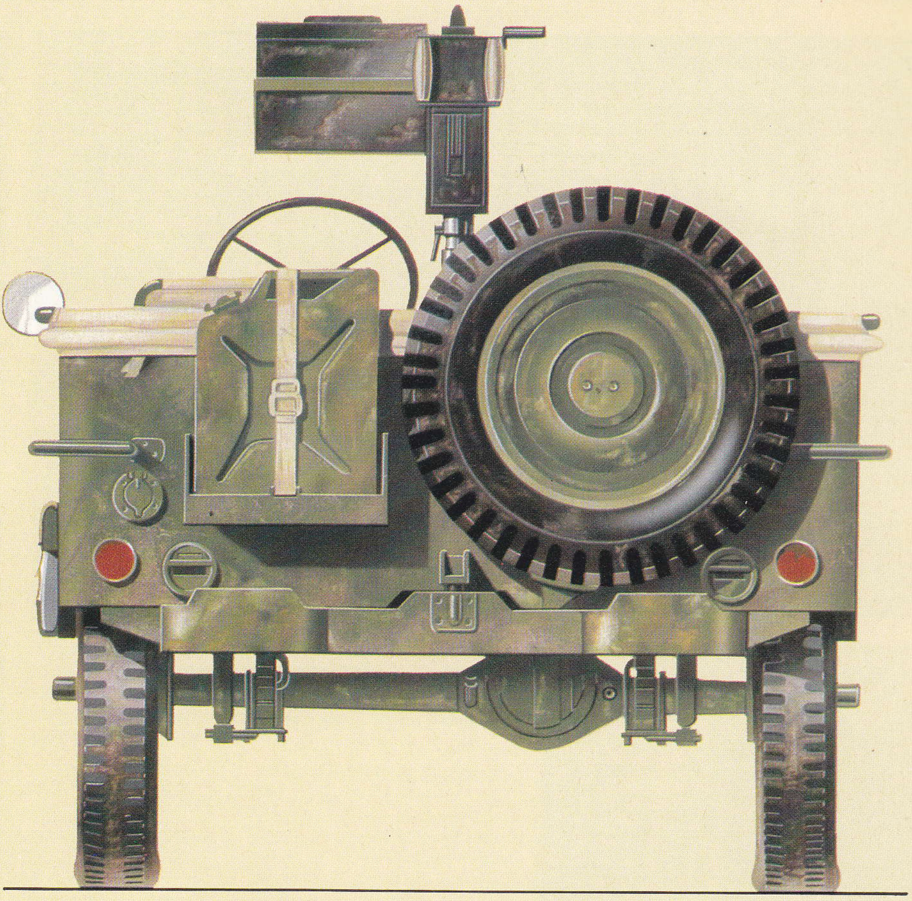


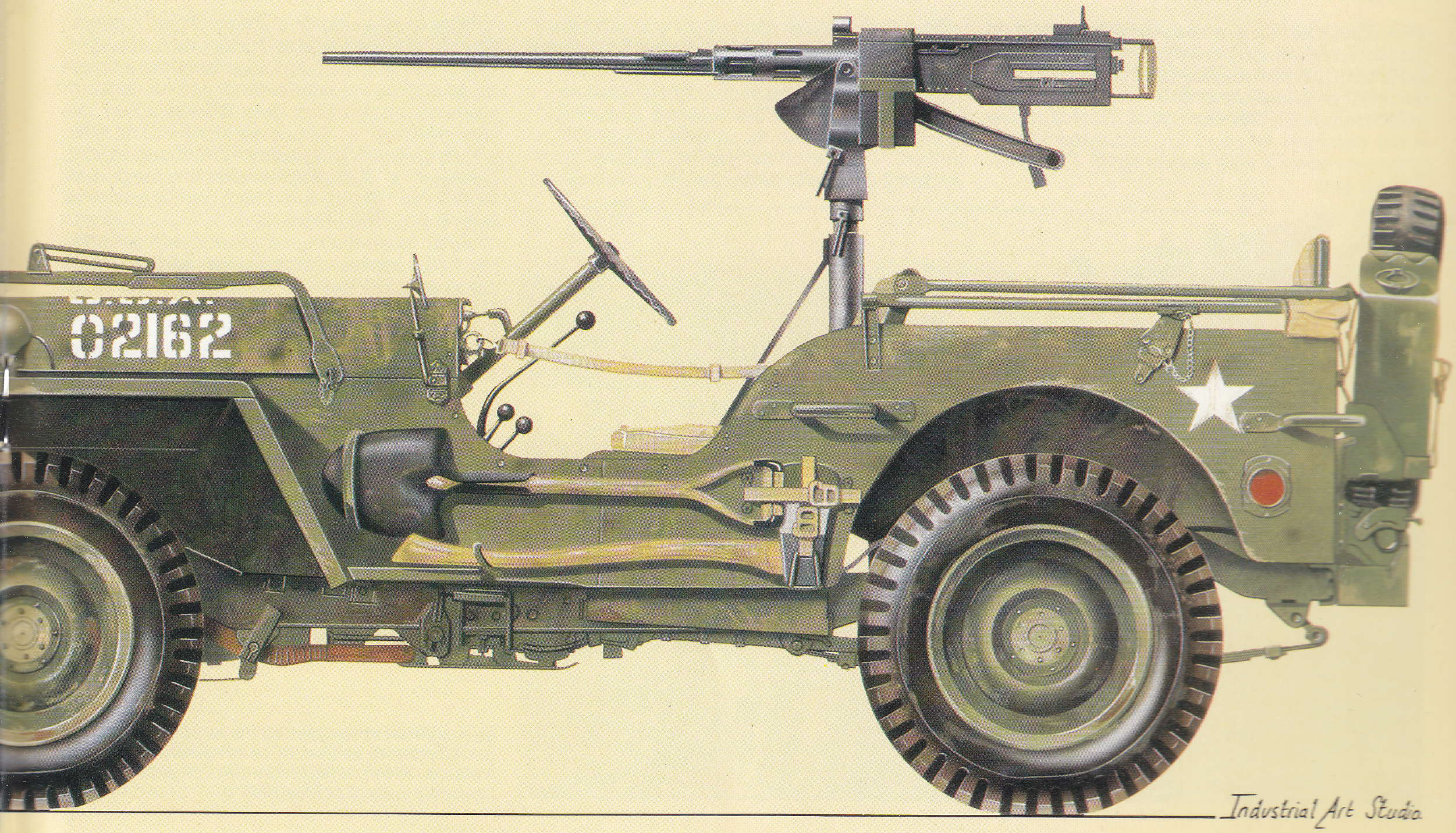
By the time of the Allied invasion of Europe, Jeeps were being put to a wide variety of purposes, many of which could not have been anticipated by the designers of a simple utility vehicle. It was used in combat, and the addition of the potent Browning M2HB 0.50-in machine-gun made the Jeep an opponent to be feared.



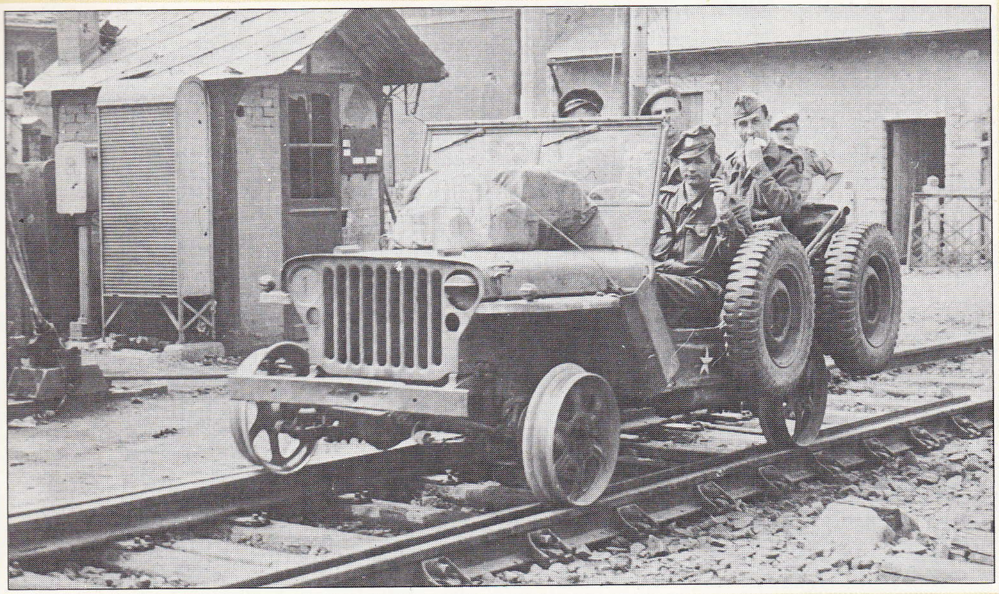








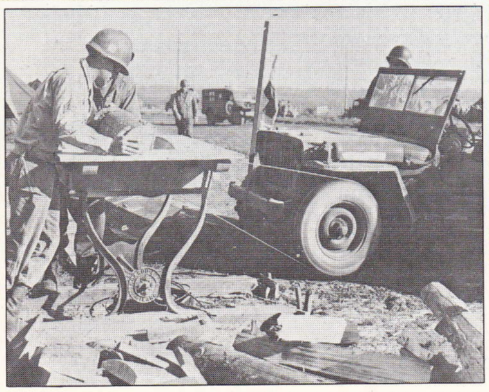
Industrial Art Studio



Above: One of the more unusual capabilities displayed by the Jeep was the capacity to act as a railway engine! Notice the road wheels stowed alongside, ready for changing.

Above: August 1942 saw the Jeep in service with the British in Egypt. The four-wheel-drive Jeep had the capacity to handle the rugged terrain.

Below: April 1944, and Australian and native New Guinea troops confer prior to a reconnaissance at Hollandia, northern New Guinea. General MacArthur had just landed during the latest stage of the south-west Pacific campaign.



Left: Need a power source for your rotary saw? No problem when you have a Jeep to hand. This bit of initiative took place at a 5th Army field hospital in Italy in 1944.

ed a significant part in reducing its capability through reduction in supplies (particularly fuel). Both LRDG and SAS vehicles usually bristled with machine-guns, usually a combination of Browning and Vickers K guns. The fuel tanks were enlarged to allow for increased range (the fuel capacity was usually about 136 litres/30 Imp gal).

The British army converted some Jeeps to Royal Signals Line-Laying Vehicles: usually the cable was reeled off at the rear from a single cable drum, and four replacement reels were often attached over the bumper at the front. The Jeep could also mount a recoilless rifle or multiple rocket-launcher. A tandem hitch made it possible to use two of these vehicle for emergency towing of a heavy artillery piece. Wading equipment was developed, consisting of a flexible 'breathing' tube from the engine supported by the windscreen, and an exhaust-pipe extension at the rear. This enabled the vehicle to wade up to a depth of 1.83 m (6 ft), adequate for driving ashore from amphibious landing craft. All Allied armies used Jeeps during World War II, including the Soviets who copied it as the GAZ-67B.

Jeeps were also used extensively as front-line ambulances. Conversions were carried out in the USA, the UK, Canada and Australia. There were two-, three- and four-litter variants. From late 1943 all Jeeps assembled in the UK were fitted with a set of sockets mounted on the four corners of the main frame which could support a tubular frame capable of carrying three stretchers (one alongside the driver and two above). The four-litter version had a high canvas tilt and carried the stretchers in two layers.

The Amphibious Jeep produced by Ford and designated GPA (General Purpose Amphibious) was based on the standard Jeep chassis but had a boat-like body designed by Sparkman & Stephens of New York. The overall design was by Marmon-Herrington. Water propulsion was by a propeller driven by a

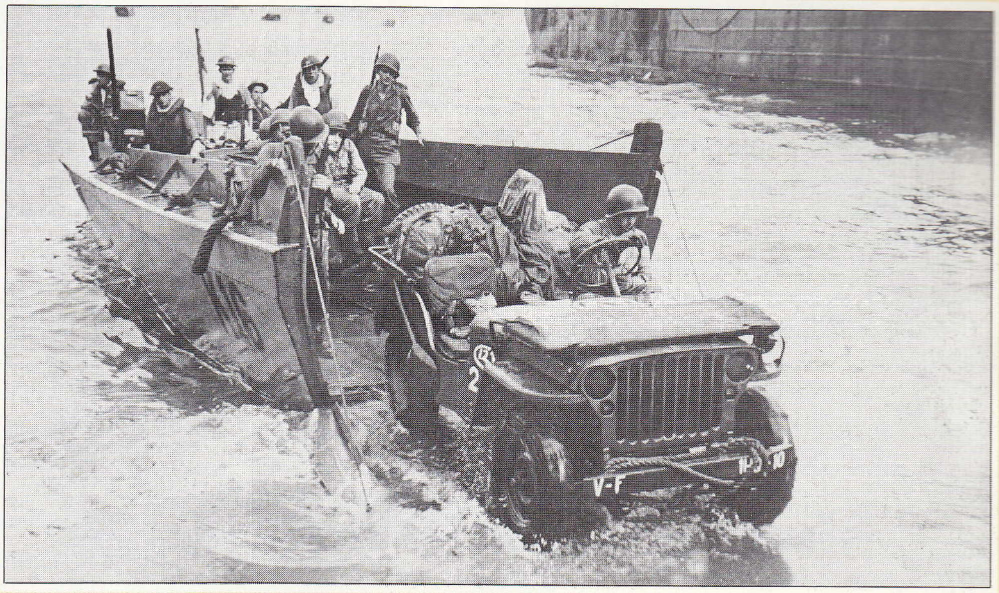
'GIBBON'S
SCOFFS'

Light utilities accompanied the airborne troops into Normandy in 1944. Here an airborne unit in training unloads a Jeep from a Horsa glider, probably in April or May 1944.

YOU ARE ENTERING
GERMANY.
AN ENEMY COUNTRY.
KEEP ON THE ALERT

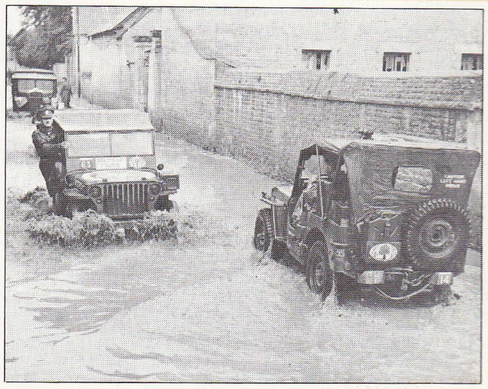
Above: The Belgian border with Germany. Even in the last stages of the war, troops had to remain alert while pockets of die-hard Nazis fought to the last bullet.

Below: General MacArthur had promised to return to the Philippines, and return he did. He is shown here after a ceremony on Leyte Island, at which he decorated Major Dick Bong, America's top-scoring pilot of World War II.



Above: A US Jeep speeds ashore onto New Guinea to take part in the Hollandia operation. Alongside, a large landing craft is beaching, and its packed complement of troops wait to take part in the assault on the Japanese fortified base.

Right: Bretteville l'Orgueilleuse, a village in Normandy, on 21 July 1944. The invasion is proceeding, and movements have to continue in spite of flooding. Before long the Allied armies will have broken out into France, sending the German forces reeling.



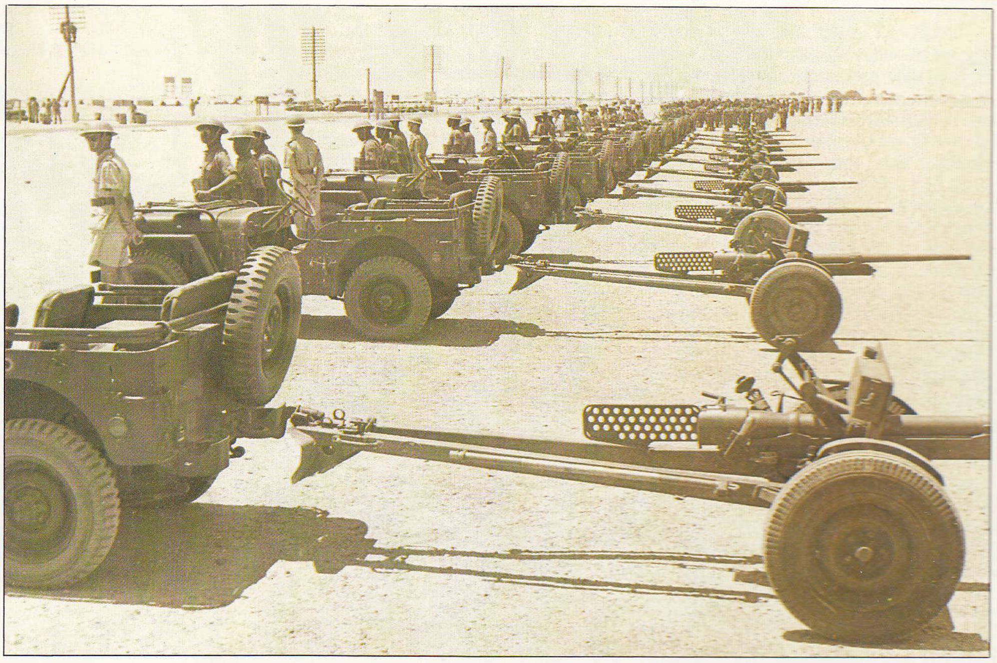
power take-off from the transmission, and the GPA was more than 544 kg (1,200 lb) heavier than the land version. A power-driven capstan was attached to the front deck, and one extra leaf was added to each suspension spring to cater for the extra weight. Mass-production by Ford began in September 1942, and in service the vehicle was known as 'Amphib' or Seep (for Seagoing Jeep). Amphibious Jeeps were also supplied to the Soviets under Lend-Lease, and after the war the Soviets copied the design, using the GAZ-69 4×4 chassis, which was standardized as the MAV (GAZ-46). Many other ideas were tried out to enable Jeeps to float, but none really caught on apart from the Seep.

There was a special rail conversion of the Jeep where the normal wheels were replaced by flanged ones; this model was used extensively in the Far East.

An early experimental development was the T25 partially armoured scout car built on the Willys MA chassis. It had armour plate around the engine compartment and an armoured shield in place of the windscreen with vision-slits and ball-mounts for small arms.

The US Ordnance Board developed several SP weapons using the Jeep (or modifications of it) as the prime mover. Several half-track versions were developed as snow-tractors. The T26E4 was standardized as Tractor, Snow, M7. The Snow Tractor T28 Penguin Jeep had rubber-band tracks and bogie wheels in place of the rear wheels. The T29 was similar but with a smaller body. Sometimes skis were substituted for the front wheels.

In 1943 the Canadian army developed the Tracked Jeep in prototype form, and this was intended as a light armoured carrier for airborne units. Five pilot models were produced by Willys with the engine mounted transversely at the rear. A similar vehicle developed by Marmon-Herrington was known as the Jeep-Tank.



37-mm M3 anti-tank guns in Egypt are lined up behind their Jeeps for an inspection by the GOC. By 1942, when this photo was taken, the American-built M3 was virtually obsolete.

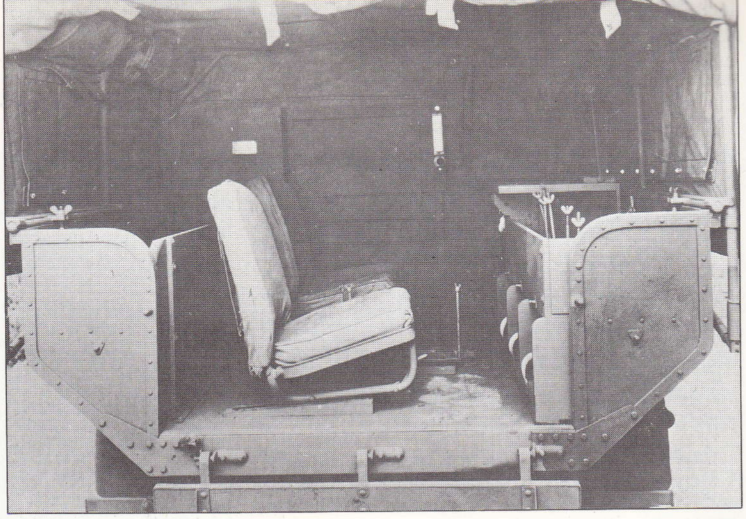
UK

Lorry, 8 cwt, 4×2, FFW, Humber

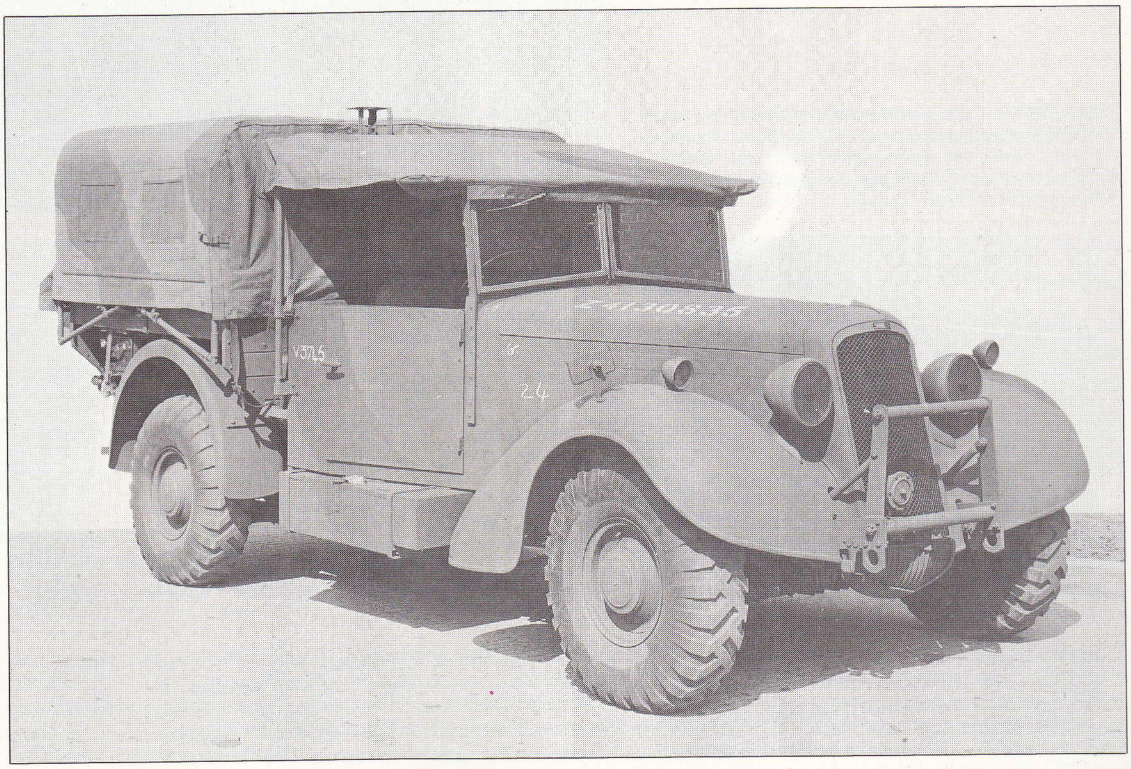
Just before the outbreak of war in 1939 the British army was in the process of intensive mechanization, and several classes of load capacity had been defined for 'B' vehicles. The second class was the 8-cwt truck which fulfilled such roles as the GS (General Service) and FFW (Fitted For Wireless). Such 8-cwt trucks with both 4×2 and 4×4 wheel arrangements were produced in considerable numbers from a period just before the war, but were eventually phased out of production in order to rationalize output and reduce the number of types in service. The 5-cwt and 15-cwt classes could carry out any duties that had been allocated to the 8-cwt class. These vehicles were manufactured by Ford, Morris and Humber. Similar in appearance, these vehicles had detachable well-type bodies with seating for three men (two facing offside and one nearside) and canvas tilts, though the wireless version had seating for two men only. Folding legs were fitted which enabled the body to be placed on the ground for use as a mobile command centre or wireless station. The **Humber 8-cwt Lorry** early production vehicles employed the chassis of the original 1939 Humber Snipe saloon with louvres in the bonnet sides. The **Lorry, 8-cwt, 4×4, FFW** incorporated the No. 11 wireless set, a map table and other fittings necessary for command operations. The wireless batteries could be recharged from a generator driven off the main engine. The GS model had the same body but lacked the radio equipment.

Specification

Lorry, 8 cwt, 4×2, FFW, Humber
Dimensions: length 4.44 m (14 ft 7 in); width 1.96 m (6 ft 5 in); height 1.89 m (6 ft 2.5 in); wheelbase 2.84 m (9 ft 4 in)
Weight: net 1769 kg (3,900 lb)
Powerplant: one Humber 6-cylinder petrol engine developing 85 bhp (63.4 kW)
Transmission: four forward and one reverse gears
Tyres: 9.00×13



Right: The Humber FFW (Fitted for Wireless) was an 8-cwt 4×2 truck with seating for two wireless operators in the body. The body was detachable for use on the ground as a wireless station or as a command centre.



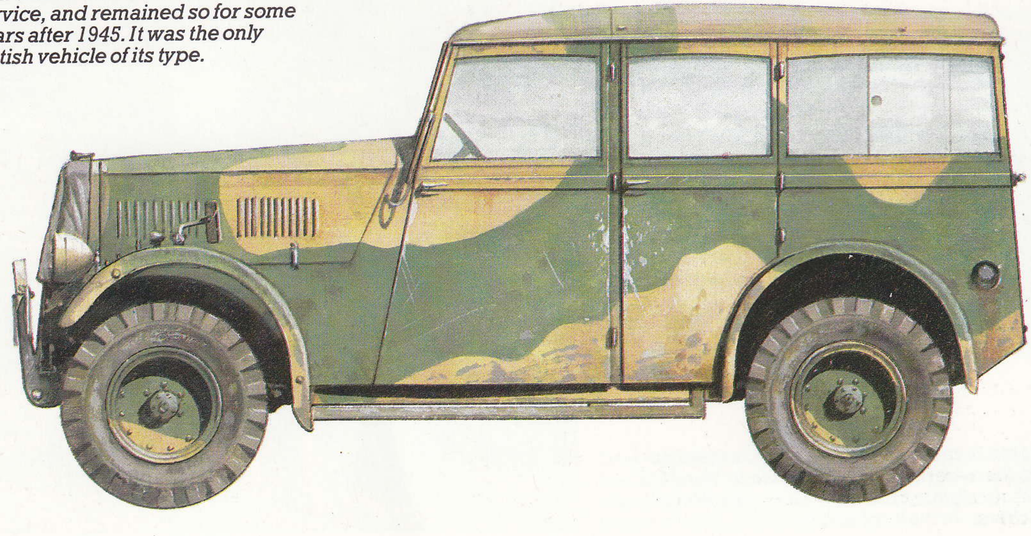
The early production version of the Humber 8-cwt lorry was based on the chassis of the pre-war Humber Snipe saloon, and could be identified by the louvres in the bonnet sides. Later these were omitted, as shown here.

UK

Car, Heavy Utility, 4×4 (FWD), Humber

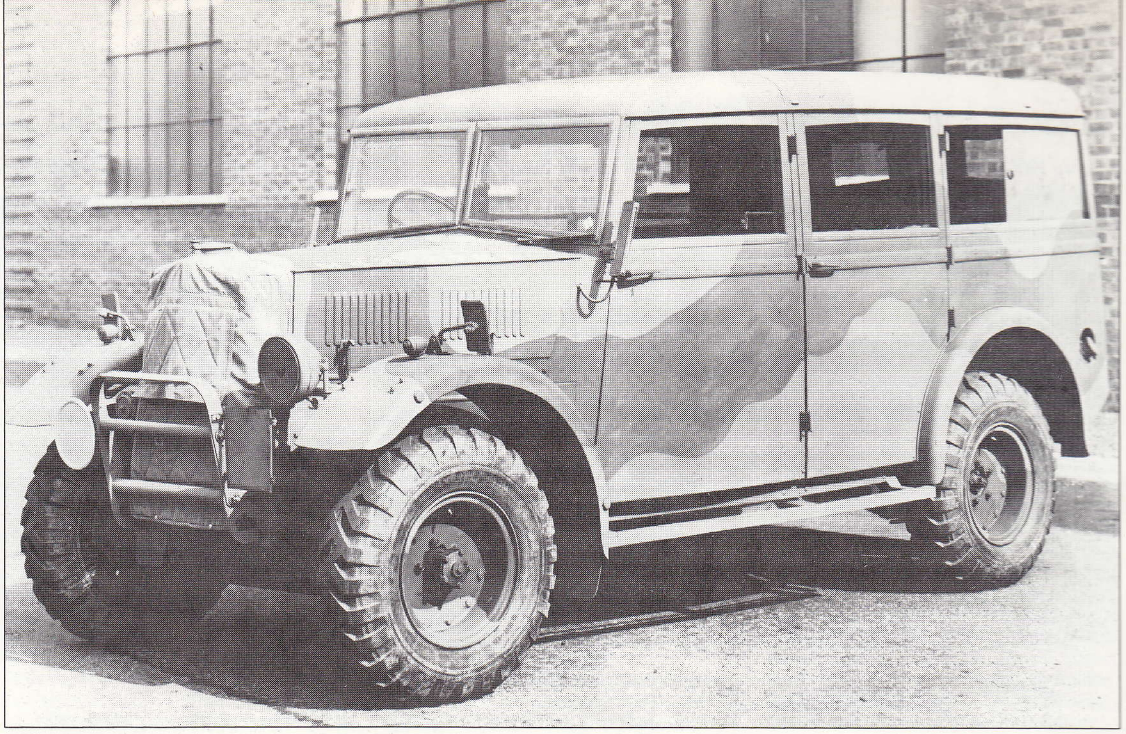
Together with the Ford 4×2 Heavy Utility, the **Humber Heavy Utility Car** was the basic staff and command car of the British army during World War II at all levels of command. Nicknamed the **Humber 'Box'**, this was the only British-built four-wheel drive utility car, and production began during May 1941, continuing for the duration of the war. Employed on a very wide scale, this staff car remained in service until the late 1950s. The cab and body were integral and of all-steel construction, and later models were fitted with a sliding roof. The body was a six-seater with four individual seats and, at the rear, two tip-up occasional seats which could be folded down to leave the body clear for stowage: there was a folding map table behind the front seats. There were two hinged doors on each side with a full-width double door arrangement at the rear. The front mudguards, radiator grill and bonnet were identical to those of the Humber 8-cwt 4×4 chassis. In the Western Desert this vehicle was sometimes modified by replacement of the roof by a canvas folding tilt. Some vehicles,

A four-wheel-drive estate car, the Humber Heavy Utility was the basic staff and command car in British service, and remained so for some years after 1945. It was the only British vehicle of its type.



especially those used by high-ranking officers, were also fitted with a sliding roof.

Specification
Car, Heavy Utility, 4×4 (FWD), Humber
Dimensions: length 4.29 m (14 ft 1 in); width 1.88 m (6 ft 2 in); height 1.96 m (6 ft 5 in); wheelbase 2.84 m (9 ft 3.75 in)
Weight: net 2413 kg (5,320 lb)
Powerplant: one Humber 6-cylinder 1-L-W-F 4.08-litre petrol engine developing 85 bhp (63.4 kW)
Transmission: four forward and one reverse gear with auxiliary two-speed
Tyres: 9.25×16

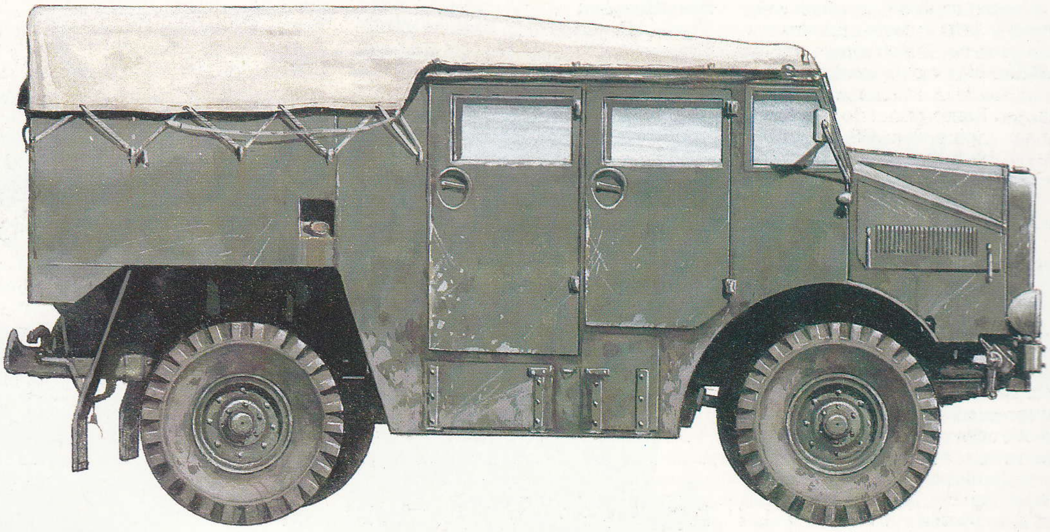


Fitted with a folding map table, the Humber Heavy Utility was used mainly as a staff car. Some were given folding canvas tops for operations in North Africa. Staff officers occasionally had forward sliding roofs fitted.

UK

Tractor, Artillery, 4×4, Morris C8

The Morris Company produced a whole range of vehicles for the British army, one of the most successful being the **Morris C8 Artillery Tractor** (popularly known as the **Quad**). Introduced in 1939, this vehicle had four-wheel drive and was equipped with a 4-ton winch driven from the transfer case. It had a distinctive beetle-shaped body and usually a towed limber and 18- or 25-pdr gun/howitzer. As far as the army was concerned the vehicles built for gun-towing had to have the same characteristics as the horse-drawn gun carriage team which they replaced, such as good cross-country performance, seating for the gun crew, and adequate stowage space for equipment and ammunition. They were always manned by artillerymen. In this vehicle there was accommodation for the driver, gun-crew commander and five men. The final model, introduced in 1944, was automotively identical but had a new body (no longer beetle-shaped) with an open top and canvas tarpaulin cover. This was introduced as a dual-purpose vehicle to tow the 17-pdr anti-tank gun or the 25-pdr gun/howitzer, and could now seat eight men including the driver. Two doors were provided on each side. At the rear of the body ammunition racks were installed to take all types of standard British artillery ammunition. This vehicle remained in service until the 1950s. The original vehicle was powered by a Morris 4-cylinder petrol engine and the gearbox had five forward and one reverse gear driving all four wheels. When the **C8 Mk III** version was introduced, however, four-wheel drive could be disengaged except in first gear and reverse.



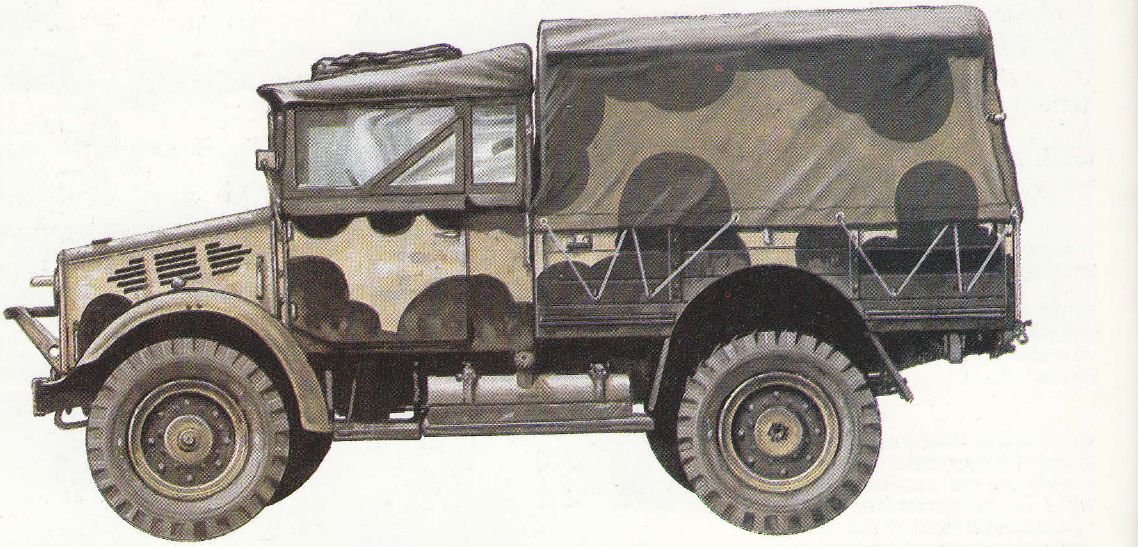
Specification
Tractor, Artillery 4×4, Morris C8 Mk III
Dimensions: length 4.49 m (14 ft 8.75 in); width 2.21 m (7 ft 3 in); height 2.26 m (7 ft 5 in); wheelbase 2.51 m (8 ft 3 in)
Weight: net 3402 kg (7,500 lb)
Powerplant: one Morris 4-cylinder 3.5-litre petrol engine developing 70 bhp (52.2 kW)
Transmission: five forward and one reverse gears
Tyres: 10.5×16

Above: The C8 Artillery Tractors were originally four-wheel-drive versions of the C8 trucks. The Mk III, introduced in 1944-5, had a canvas top and square contour body.

Morris was one of the many suppliers of GS pattern trucks, and the C8 4×2 was one of the major types lost in numbers at Dunkirk. Some were used in the desert, however. The C8 was eventually upgraded to four-wheel drive.

UK

Truck, 15 cwt, GS, 4×2, Bedford MWD



During 1935 the War Office carried out trials with new lorry models, and the Bedford Truck Division of Vauxhall Motors Ltd submitted various prototype vehicles. One of these was a modification of the commercial 2-ton lorry with rear-wheel drive. Following the trials the vehicle was fitted with a new radiator and larger tyres. After further trials in 1936 the chassis was modified to increase the ground clearance and a new engine cooling system was incorporated. In 1937 a special-totype Bedford WD prototype was produced on this chassis, rated at 15-cwt payload capacity. The most noticeable feature was the flat full-width bonnet necessitated by the extra-large air-filter specified by the War Mechanisation Board. During 1938 a more powerful engine was used. An initial order for 2,000 **Bedford 15-cwt Truck** vehicles was placed in August 1939, the first 50 being constructed as special portée vehicles to carry the 2-pdr anti-tank gun. Originally, the vehicle had an open cab with folding windscreen and collapsible canvas tilt, but from 1943 an enclosed cab with side-doors, canvas top and perspex side screens was adopted. By the end of the war Bedford had produced a total of 250,000 vehicles, a large proportion of which were this model. The vehicle remained in service with the British army until the late 1950s. Although intended mainly as a workhorse for the infantry, the Bedford 15-cwt GS eventually became used by all arms including the Royal Navy and the RAF.

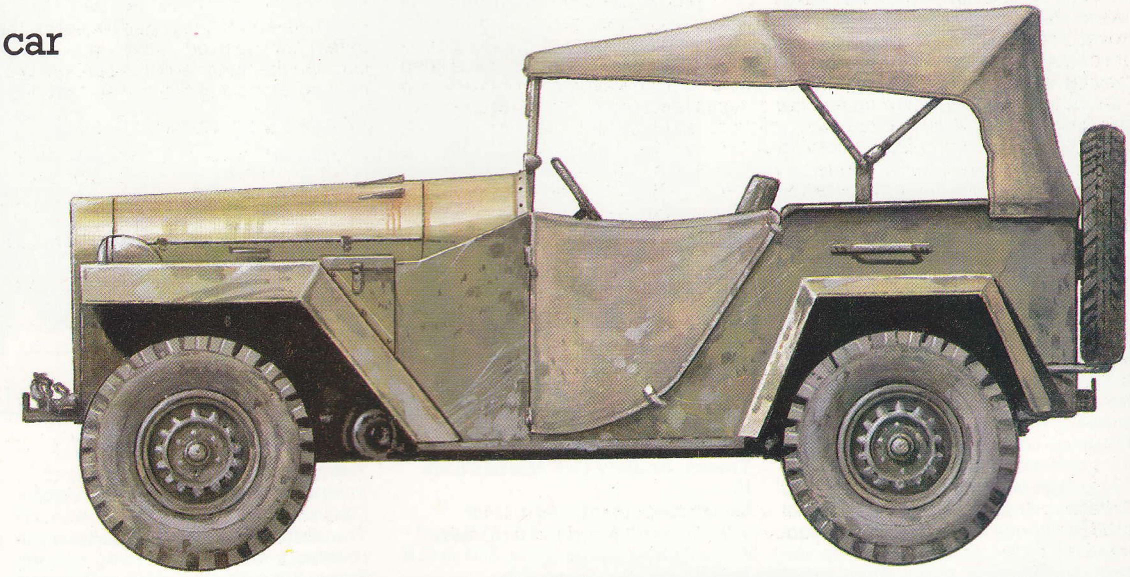
Specification

Truck, 15 cwt, GS, 4×2, Bedford MWD
Dimensions: length 4.38 m (14 ft 4.5 in); width 1.99 m (6 ft 6.5 in); height 2.29 m (7 ft 6 in) with GS tilt and 1.93 m (6 ft 4 in) with GS tilt; wheelbase 2.51 m (8 ft 3 in)
Weight: net 2132 kg (4,700 lb)
Powerplant: one Bedford 6-cylinder OHV 3.5-litre petrol engine developing 72 bhp (53.7 kW)
Transmission: four forward and one reverse gears
Tyres: 9.00×16

The 15-cwt class of truck was most important to the British army, numbers in use rising from 15,000 in 1939 to 230,000 in 1945. The Bedford MWD with GS body is typical of a late-war 15-cwt 4×2 truck.

USSR

GAZ-67B light car

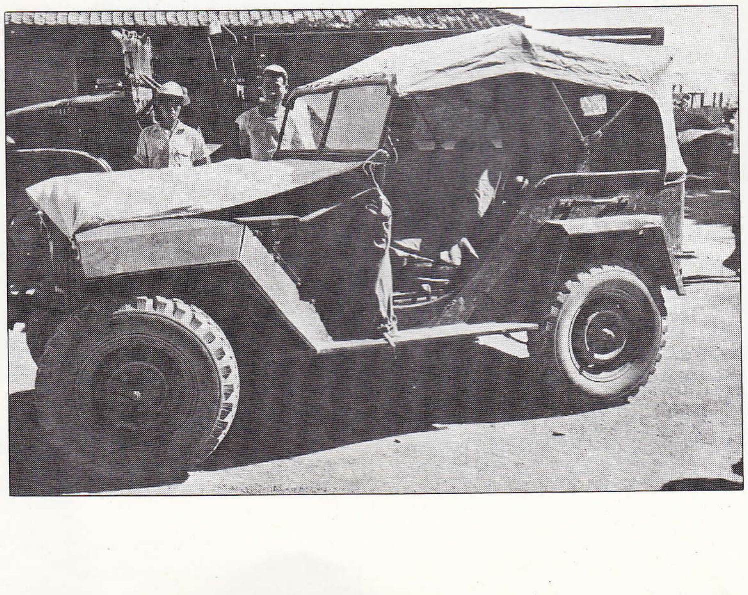


The **GAZ-67** (named for the Gorkiy Avtomobil Zavod, or Gorky Car Factory) was first manufactured in the Soviet Union during 1943 as a cross-country vehicle for the transportation of personnel and light equipment. It was obviously greatly influenced in design and construction by the US Bantam Jeep (the USSR received some 20,000 Jeeps during World War II under the Lend-Lease programme). In particular the body and headlamp arrangement were very similar to those of the Bantam. The vehicle was powered by the Soviet Ford (GAZ) Model A 4-cylinder side-valve engine, and the wheels, suspension and other automotive components were similar to those used on other GAZ cars, with the exception of the use of four-wheel drive. Suspension was through quarter-elliptic springs. The fuel tank was located below the dashboard. The vehicle was fitted out with four seats and was capable of speeds up to 90 km/h (56 mph). Compared with the US Jeep it had very poor acceleration. The **GAZ-67B** differed from the original GAZ-67 in that it had a longer wheelbase (1.85 m/6 ft 0.75 in as against 1.27 m/4 ft 2 in). This model saw extensive service in Indo-China (where the only existing specimen in the West was captured by the French) and Korea. Production ceased in 1953, the role being taken over by the GAZ-69A. This class of light vehicle has always been used as the workhorse of the airborne divisions.

Specification

GAZ-67B
Dimensions: length 3.34 m (10 ft 11.33 in); width 1.68 m (5 ft 6 in); height 1.70 m (5 ft 7 in); wheelbase 1.85 m (6 ft 0.75 in)
Weight: net 1220 kg (2,690 lb)
Powerplant: one GAZ-A 4-cylinder 3.28-litre petrol engine developing 54 bhp (40.3 kW)
Transmission: four forward and one reverse gears
Tyres: 6.50×16 or 7.00×16 (metric)

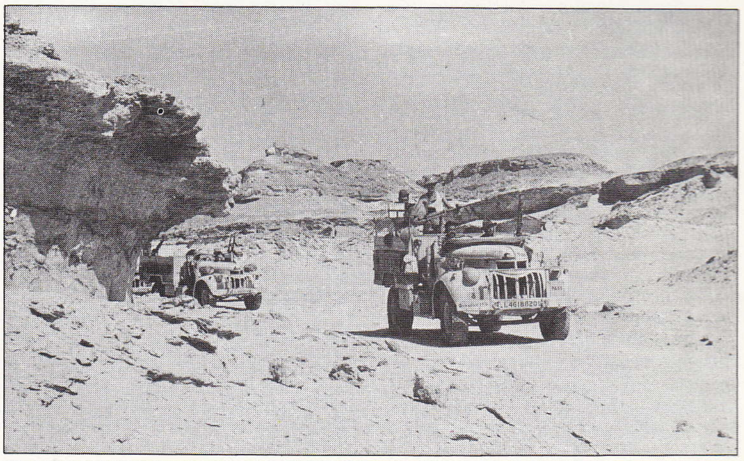
Above: First made in 1943 at Gorky, the GAZ-67 was influenced by early Jeeps (20,000 having been sent under Lend-Lease). Simple and rather crude, the GAZ-67 was nonetheless strong and a good off-road performer.



Right: The GAZ-67B saw extensive service in Korea, where this particular vehicle was captured, as well as being used in numbers during World War II. It was eventually replaced by the GAZ-69.

Desert and Winter Conditions

World War II was a genuinely global conflict, and as such manufacturers had to expect their products to be subjected to 120°-plus heat in the deserts as well as to 80° of frost in the USSR. In addition, the terrain could vary as much as the temperature.



Vehicles took a terrible pounding in the desert, especially during deep penetration missions by the Long-Range Desert Group. Simple, robust trucks such as these Canadian Chevrolets were essential, as breakdowns could mean death.

One must appreciate the immense difficulty confronting motor-vehicle manufacturers during World War II: they had to design vehicles that could negotiate difficult terrain and wade through water, stand up to rough handling by semi-skilled or even totally ignorant troops, be produced in sufficient quantities under conditions of intense bombing and shortage of raw materials and, not least of all, could operate in severe climatic conditions from the steppes of the USSR to the vast deserts of Africa to the tropical jungles of the Far East. Operating conditions ranged from intense heat with shortage of water, extended supply lines and the abrasive effect of sand, to temperatures well below zero where grease froze solid, to environments where insects would strip the insulation from electrical cables and the moist air corrode metal into a powder. As the war progressed and more experience was gained, so the vehicles became more reliable and better suited to the harsh climatic conditions. For some nations the requirements were not so widespread: Japan, for instance, had theatres of operations which did not embrace areas of extreme low temperatures or expanses of desert. For others, particularly the USA and Germany, the requirements were widespread. The USA was fighting an intense war against Japan and, although not directly involved with harsh sub-zero temperatures, was supplying vast quantities of vehicles to the USSR, which was involved with such conditions. Likewise the Germans had to cater for all these conditions, and their inability to do so adequately (particularly in the USSR) was a significant contributory factor to their final defeat.

Desert conditions (Allied)

In general, British, Commonwealth and US vehicles used in the desert campaigns were very good. The effect of standardization really showed up here because vehicles were operating under the logistical condition of almost total self-containment. As a result of standardization, vehicles that had been destroyed or that had broken down could be cannibalized for spare parts, and groups of vehicles, like the LRDG (Long-Range Desert Group) and convoys, could keep moving. The main disadvantage of standardization, however, soon came to the fore. Restriction to a minimum number of types meant that 'all the eggs were in one basket', so if a vehicle type turned out to be unreliable then there was no alternative to take its place. Fortunately for the Allies, when this did occur it usually was not a major task to rectify the problem. During the early days the British had trouble with the containerization of POL (petrol, oil and lubricants) and water, but with the capture of German equipment they became acquainted with the standard German liquid container which they copied and nicknamed the 'Jerry Can'.

Desert conditions (Axis)

With the exception of motorcycles, the vehicles employed by the Germans in the desert in general proved a match for the rigorous demands made on them and also showed that they could stand up to prolonged use. One serious problem during the early days was spring breakage which occurred on a very large scale on passenger cars and lorries. Insufficient air-filtering was widely responsible for engine troubles on all types of vehicles and a change in the design of filters was eventually introduced. The Volkswagen Kübel could negotiate almost anything except shifting sand dunes, but desert sand caused wear on stub-axles and frame heads after some 240 km (150 miles), and selector forks and clutches were found to be weak. If carefully maintained, the light and medium cross-country cars lasted well, but after some 5000-6000 km (3,100-3,725 miles) every conceivable type of trouble appeared on the Kübel. The Opel-Blitz S and Ford V8 lorries, originally commercial vehicles designed for European use, proved very good, although they could not stand up to long desert drives. The Opel proved the better of the two vehicles. Twin wheel arrangements were found to be unsatisfactory because of the damage caused by stones becoming wedged between the tyres. In the case of the Ford, a basic defect that caused many breakdowns was the continual breaking of valve springs: the material of the springs was found to be too hard, and no sooner had new springs been fitted than they too broke.

Ardennes, December 1944. Light vehicles operating in European winter conditions were further encumbered by armour (a field modification) and with heavy machine-guns.

Winter conditions (Allied)

Problems in operating vehicles under severe winter conditions were experienced by all the Allied forces, but none more than the Soviets. The Soviet Union would have been almost entirely deficient of motor vehicles after the initial German campaigns had it not been for US Lend-Lease aid. Very little has been forthcoming from the Soviet Union regarding the reliability of these vehicles, but from previous experience of Soviet historians who have commented in depth upon the inferiority of US and British armour in comparison with their own, no news is good news. That is to say, the reliability of these American vehicles must have been very high indeed for there to be no printed criticism from the Soviet Union. The Soviets had perfected a special kind of vehicle for severe winter conditions, called the Aerosleigh, consisting of a van-type body supported on spring-loaded skis with an aircraft piston engine pushing the vehicle along. This proved very successful as a reconnaissance vehicle, an infantry carrier and as a load carrier, being capable of speeds up to 80 km/h (50 mph) across snow and ice. The Germans had no equivalent in significant numbers.

Winter conditions (Axis)

Many of the standard German vehicles were used in the USSR under all conditions and these performed relatively well under the circumstances. The Kfz 12 (Steyr) medium car was technically a highly-developed and efficient vehicle, and performed very well. Originally developed for tropical climates, it required alteration of the cooling system to make it entirely suitable for Soviet front winter temperatures. Despite these alterations and careful packing with every available means, it was still not possible to achieve the required operating temperature which resulted in the carburettor choking leading to severe strain on the transmisson. Even with completely closed louvres and travelling in low gear the temperature usually remained below 40°C (104°F). The Opel 4×4 lorry was a complete success: even in snow it was manoeuvrable and had few breakdowns. On the other hand, with many of the other vehicles there were several serious problems such as clutch slip resulting in damaged transmissions, cracking of fuel pipe connections and radiators, and locking of the steering through icing up. Those vehicles without four-wheel drive got into difficulties even on prepared roads.

It should be remembered here that the Germans had developed a whole range of half-track vehicles which supplemented all classes of wheeled vehicle, and these former proved excellent under all terrain conditions whether desert or snow. Their only major failing was freezing of the overlapping (Famo) road wheels, making the vehicles immobile during the early hours of the morning. As mentioned elsewhere the Germans had literally hundreds of different makes and models of cars and lorries in the USSR, which made repair and maintenance a nightmare. As in the desert, vehicles had to operate a long way from base camps and this made essential the logistical principle of total self-containment. Unlike the Allies, however, cannibalization of immobile or knocked-out vehicles could not solve the problem effectively.

Long-Range Desert Operations

The desert imposes its own rules upon the men who fight in it. To succeed, an unusual type of soldier is required. Such types were found in some numbers in World War II, enabling the formation of the Long Range Desert Group.

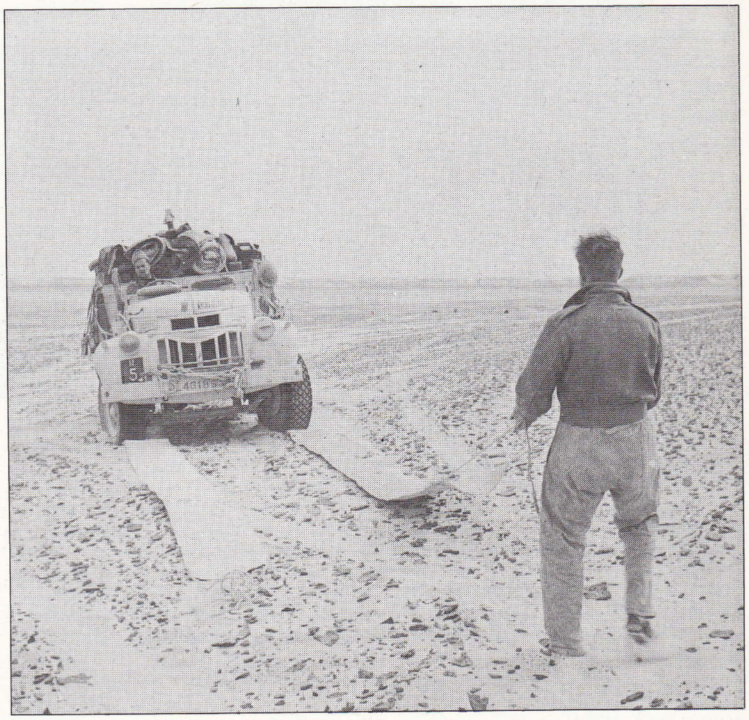
The Long Range Desert Group was 'officially' formed in September 1940, when it had already been operating for some months. It was a most unusual formation that seemed to answer to no one, and was formed from an odd mixture of men who had only to know the North African desert intimately to join. Recruits came from civilian life, or were military 'odd-bods' never quite able to assume conventional military disciplines and a few regular soldiers whose penchant was for that odd form of warfare epitomized by Lawrence of Arabia in World War I.

The Long Range Desert Group (LRDG) answered to no particular military formation or level, and acted very much on its own. It had no particular operational base other than Kalbrit in the Suez Canal Zone, and once away from the rest of the military in the desert it acted primarily as a reconnaissance unit. It operated by stealth and guile, only rarely daring to assume a directly hostile posture, choosing rather to melt away into the desert wastes whenever trouble threatened. But the LRDG could and did fight on many occasions. If it was ever caught by enemy forces the LRDG was well equipped with numbers of automatic weapons of all kinds, and the men of the LRDG were experts in their use. But reconnaissance at long range was the main task of the LRDG.

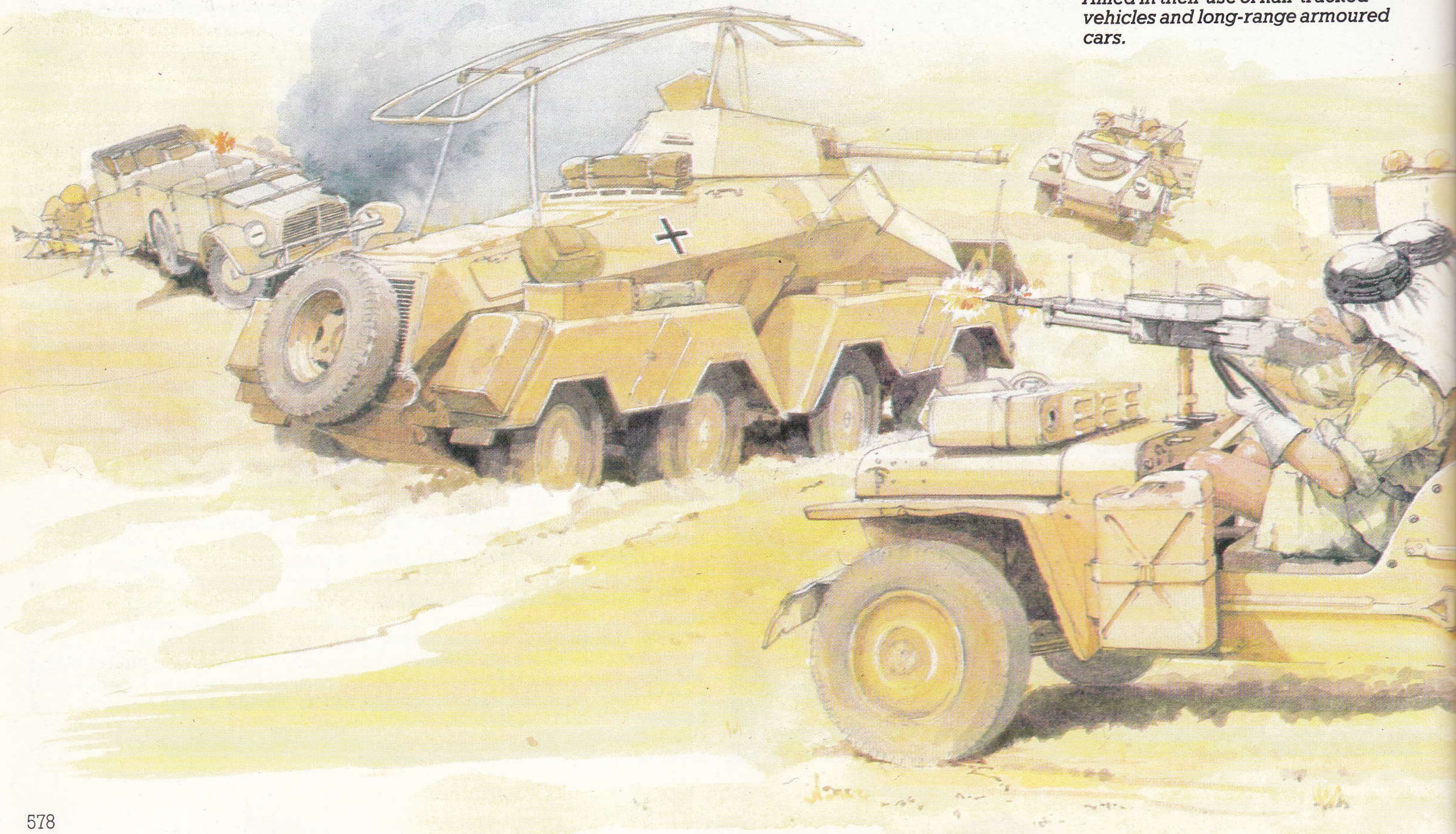
A typical LRDG mission was normally formed around a small number of vehicles. The central unit of the small forces was a 4×4 Chevrolet or other types of truck specially converted for the LRDG role by the addition of extra fuel and water tanks, racks for equipment and radios, and space for the crew's kit and weapons. This truck would also carry the main support weapons of the force, usually a captured Italian 20-mm cannon or a heavy machine-gun. The rest of the force would use Jeeps liberally festooned with air-cooled machine-guns (Vickers 'K' guns or Brownings) and yet more fuel and water tanks. These small forces would make their way behind enemy lines by driving far to the south beyond the open enemy flanks and then driving north to the area of choice. The final approaches were usually made by night, and the units holed up by day.

During the day the reconnaissance function came to the fore. All manner of military information was gathered, such as the number of tanks visible, unit markings, types of trucks and loads visible, the numbers of aircraft on airfields, and so forth. At times prisoners were taken for later interrogation, and the results of all this intelligence-gathering was sent back to Cairo by radio.

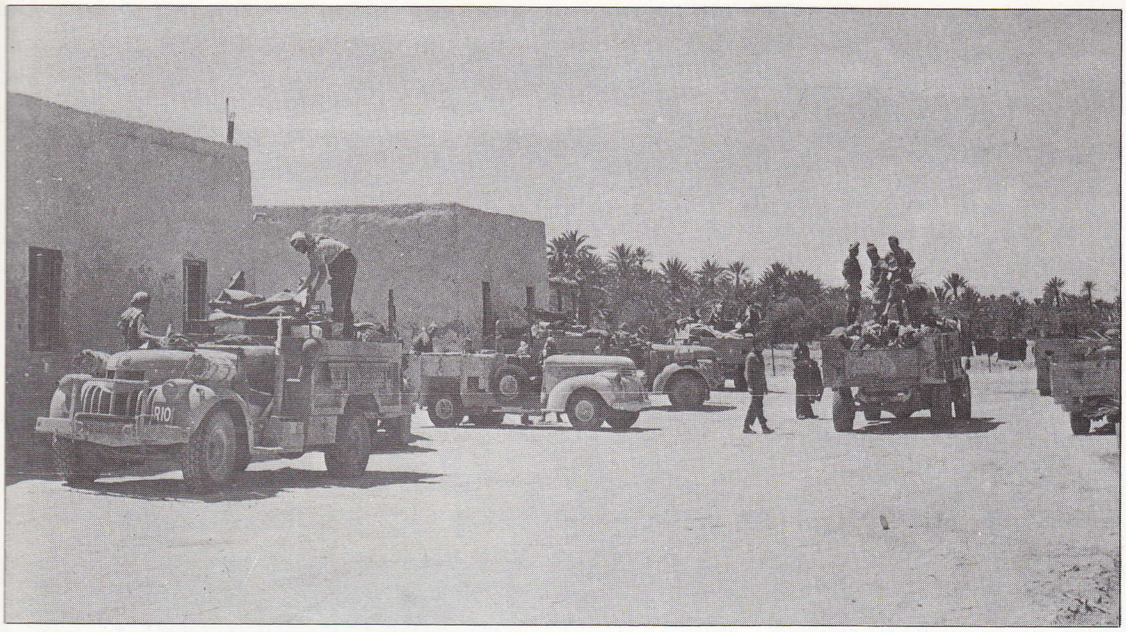
Not all the LRDG activities were confined to this passive role. From 1941 onwards the LRDG acted as the carriers for the newly-formed Special Air Service, or SAS, who had a primarily offensive raiding role to disrupt activities in the enemy's rear areas. The men of the SAS were very similar in outlook and methods to the LRDG and on many occasions the LRDG carried the SAS on their vehicles on long-range raiding missions. Not all these missions were effective but some were quite spectacularly successful. On one occasion the SAS approached an enemy airstrip and under covering fire from the LRDG proceeded to break up an officers' mess party with Thompson sub-machine guns while



Sand tracks were part of the equipment of every vehicle, helping them out of soft ground; on occasion, long stretches were traversed. It was a nerve-racking job, with troops under the constant fear of being spotted from the air.



Two opposing desert patrols meet far from the nearest help. German patrols differed from those of the Allied in their use of half-tracked vehicles and long-range armoured cars.

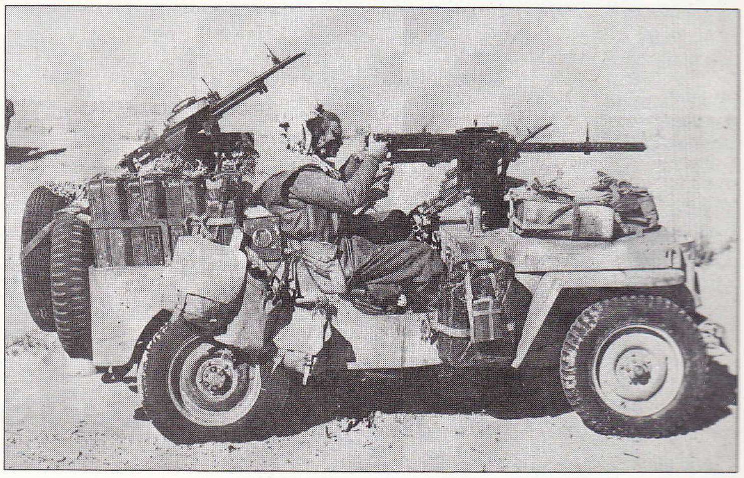


Left: Operating from Kalbrit in the Canal Zone, a Long Range Desert Group reconnaissance patrol is about to get under way. While they would fight if necessary, the primary function of the LRDG was the gathering of information, and they operated mainly by stealth and guile. It was left to the SAS to perform offensive operations using the same techniques.

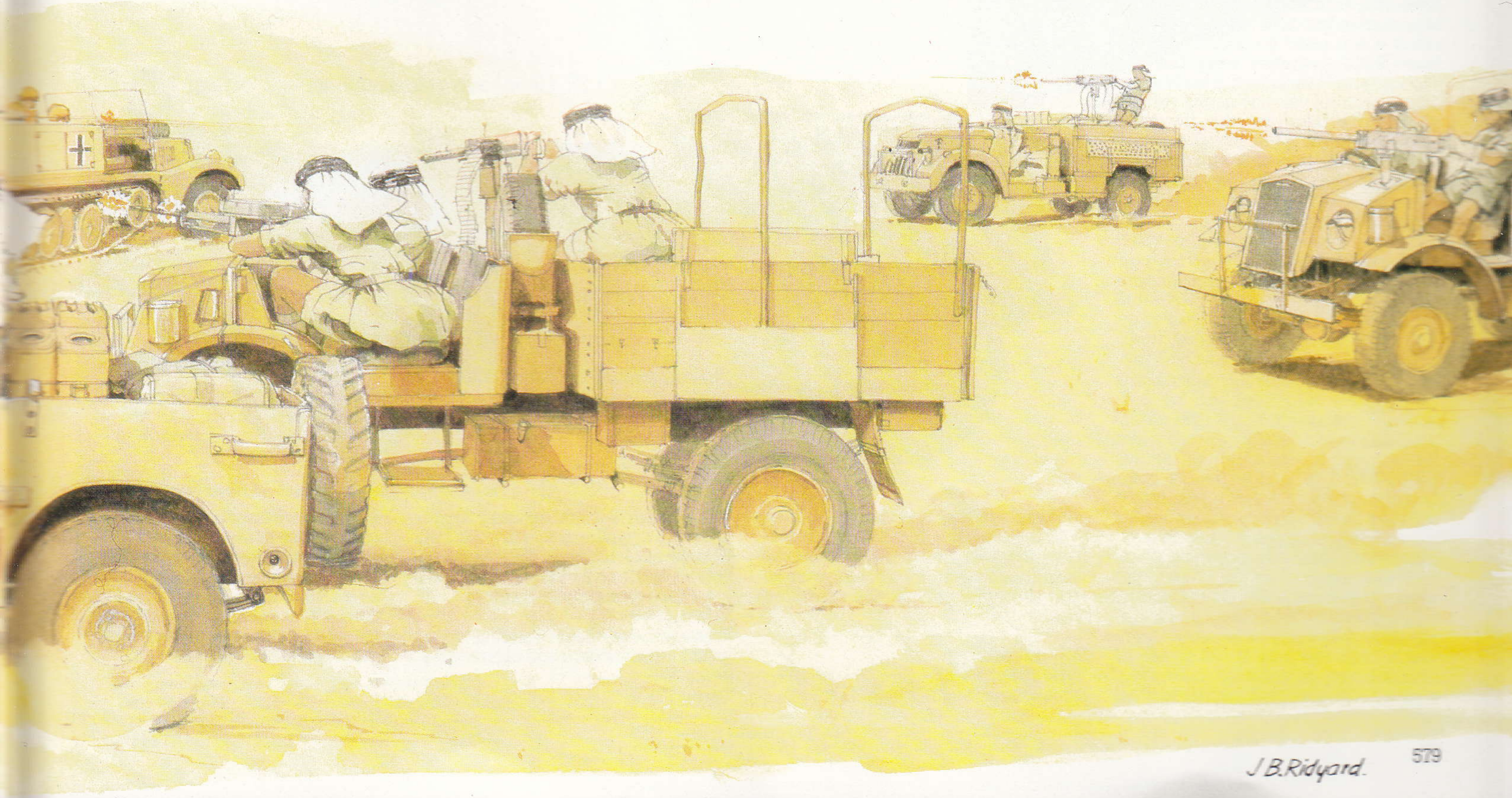
another party rushed around the strip blowing up aircraft with grenades; when the SAS party ran out of grenades one aircraft remained intact, but this was disabled when one SAS man tore out the instrument panel by hand! Then the SAS and LRDG men joined up and made off into the desert once more.

Raids as spectacular as that were not common, but the SAS and LRDG often combined on similar nuisance raids well behind the enemy rear, keeping the Italians and the Germans on their toes and never sure when they were being watched or counted. Airfields were a particularly favoured target, for a few Jeeps could sweep in, open fire with machine-guns for a few vital moments, create havoc and then vanish leaving precious aircraft as wrecks. But the prime role of the LRDG was reconnaissance, and time and time again their reports enabled the British and Commonwealth commanders to make important decisions that enabled the rest of the army to attack when and where it counted most.

The LRDG operated well in advance of the Allied advance right up to the approaches to Tunisia, where the terrain was not so well suited to its tactics. But the LRDG units remained in being, albeit on a more formal basis than the free and easy days of the desert campaigns, and they were later used to good effect during parts of the Sicily and Italy campaigns. Gradually the LRDG was absorbed into the expanding SAS and to this day the SAS maintains some of the old LRDG spirit and traditions. Even the modern SAS Land Rovers with their arrays of machine-guns evoke memories of the adventurous methods of the LRDG.



Below: The Special Air Service was formed in 1941 primarily to act in an offensive role against enemy rear echelons. SAS Jeeps were often heavily armed, as here, with Browning 0.30-in and Vickers gas-operated machine-guns. Gradually the offensive role came to include long-range reconnaissance, and the rapidly expanding SAS absorbed the LRDG.



ITALY

Autovettura Fiat 508 C.M.

Most light vehicles used by the Italian armed forces were of Fiat manufacture. Where the Germans had designed and produced several pseudo-military vehicles before the war, so had the Italians, the **Autovettura Fiat 508 C.M.** being one of them. The Italians referred to the type as a colonial vehicle, specially designed for use on rough terrain such as that encountered in Africa and Ethiopia. Also known as the **Fiat 1100 Torpedo Militare**, the Fiat 508 C.M. was the most prolific Italian military vehicle of World War II. Just before the war the Ispettorata della Motorizzazione (Inspectorate of Motorization) had requested development of a light, simple and robust vehicle capable of achieving high speeds on roads and reasonable performance cross country, with low production costs. As the result the Fiat Company developed the **Torpedo 508**, derived from a similar civilian model, from which it differed in an increase in ground clearance, a reduction in the gearbox ratios and a special military body. The vehicle was built in substantial numbers and in various versions between 1939 and 1945, one of which was a special colonial model adapted to avoid ingress of sand and sinking in soft terrain (**Modello 1100 Col.**).

Specification

Autovettura Fiat 508 C.M.

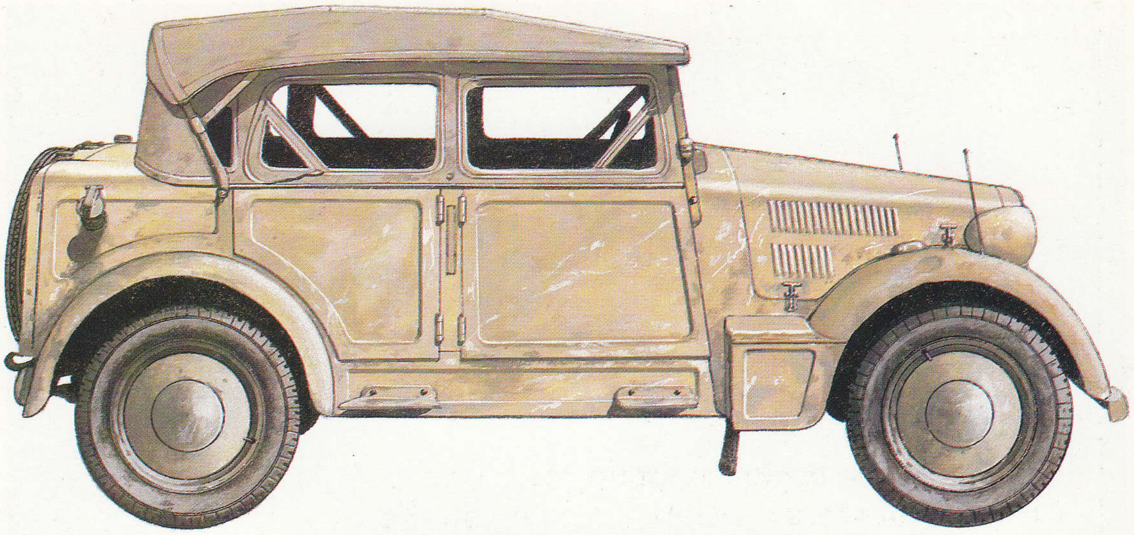
Dimensions: length 3.35 m (11 ft 0 in); width 1.37 m (4 ft 6 in); height 1.57 m (5 ft 2 in); wheelbase 2.26 m (7 ft 5 in)

Weight: net 1065 kg (2,348 lb)

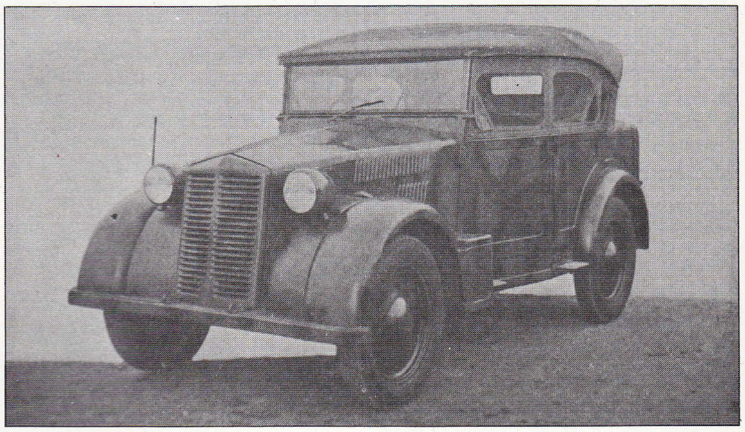
Powerplant: one Fiat 108C 4-cylinder petrol engine developing 32 bhp (23.9 kW)

Transmission: four forward and one reverse gears

Tyres: 5.00×18 (metric)



Above: The Fiat 508 was developed from pre-war colonial designs, and like many Italian vehicles little was required to militarize a car designed for rough tracks in Libya and Eritrea.



Right: Based on the 'balilla' civilian model, the 508 C.M. was in production from 1939 to 1945. It was a simple vehicle, with reasonable cross-country performance and a high road speed.

JAPAN

Type 95 Scout Car (Kurogane Black Medal)

The **Type 95** was a lightweight reconnaissance vehicle developed after the Manchurian Incident, which had indicated a real need for such a vehicle. Some 4,800 examples were built by Kurogane with variations in bodywork. This was about the only native vehicle of its type used by the Imperial Japanese Army. Most others were of American origin or patterned on American designs. The air-cooled engine was ideal for operations in Manchuria and northern China, where there was often a lack of unpolluted water and frequently very low temperatures. Initial difficulties were experienced with the four-wheel drive and front universal joints, but these were eventually overcome. Special tyres, with heavy rubber treads, were provided for exceptionally difficult terrain. Power was supplied by a 4-stroke, 2-cylinder V-1-A-F 1399-cc air-cooled engine operating on petrol and developing a maximum of 33 bhp (24.6 KW). The engine had a compression ratio of 5:1 and a removable cylinder head. Ignition was provided by a high-tension magneto with a 12-volt generator for charging the battery; a 12-volt electric starter motor was used. Oil pressure was maintained by a gear-pressure feed pump, and a conventional fuel pump was used. There was a main fuel tank for 35 litres (7.7 Imp gal) and an auxiliary fuel tank of 4-litre (0.88-Imp gal) capacity. Fuel consumption was stated to be 4 litres (0.88 Imp gal) per hour. A dry single-plate clutch was used. The foot-brakes were mechanical contracting with an emergency mechanical expanding type.

Specification

Type 95 Scout Car

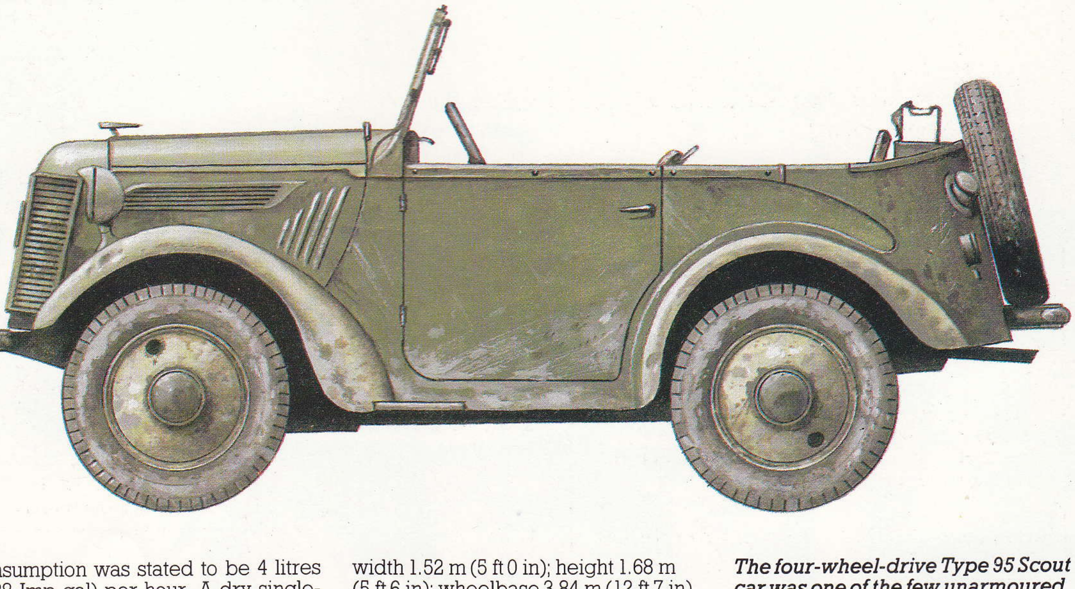
Dimensions: length 3.38 m (11 ft 1 in); width 1.52 m (5 ft 0 in); height 1.68 m (5 ft 6 in); wheelbase 3.84 m (12 ft 7 in)

Weight: net 1,100 kg (2,425 lb)

Powerplant: one 2-cylinder 4-stroke V-1-A-F petrol engine developing 33 bhp (24.6 kW)

Transmission: selective sliding type giving three forward and one reverse gears

Tyres: 18×6



The four-wheel-drive Type 95 Scout car was one of the few unarmoured vehicles used by the Imperial Japanese Army that was not based on an American original. The 'Black Medal' was made in closed cab and truck versions in addition to the more usual convertible.